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MONTANA OUTDOORS

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MONTANA OUTDOORS

March/April 1986, Vol. 17, No. 2
(USPS 360 280)

Front Cover
Mike Logan's striking photo brings into focus some of the adjectives used to describe bighorns: majestic, powerful, elusive.

Inside Front Cover
The photo of the mountain bluebird is by Harry Engels, and it is only one species aided by the nongame checkoff; when you are checking over your income tax form, make a check for nongame wildlife.

Back Cover
Join millions of others and "Discover Wildlife in Your World" by celebrating National Wildlife Week, March 16-22. There's a world of wildlife awaiting your discovery, such as the bald eagle on this issue's back cover poster.

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Wildlife managers have made great strides in restoring Montana's big game populations, but tomorrow's biggest challenge may be coping with increasing recreational demands.

It's an ongoing discussion. Every time DFWP wildlife managers get together, they talk about the status of our big game resource, what the residents of Montana seem to want from their wildlife agency, and how the department can improve the quality of its program. The public will concerning big game management is not always easy to determine, let alone satisfy.

Every year department wildlife managers evaluate the reports of more than 60 state biologists and another 30 or so federal and private biologists scattered throughout the state. The managers also evaluate a statewide harvest survey, take the pulse of public sentiment at more than 40 local meetings on upcoming seasons, and answer several thousand phone and letter comments each year.

The major problem seems to be one of perspective. The view of most individuals and some organizations is usually focused on a relatively small part of the overall situation. Sometimes this perspective just doesn't square with what the DFWP has documented for the resource in general. Occasionally the suggested course of action is out of line with what will best serve the majority.

Often a particular demand is politically checked by strong feelings of other individuals and groups in the opposite direction. More and more, DFWP managers are forced to look for a compromise and settle for a consensus.

Although population estimates are difficult to make, and can never be exact, we know by every indicator that Montana's big game populations are healthy. Wildlife biologist Tom Mussehl in 1985 summarized the status of Montana's big game in a document entitled "Design for Tomorrow, 1985-1990." With the help of regional wildlife managers and other biologists, Mussehl pulled together the facts and concluded that statewide, Montana's big game populations are the highest they have been in this century. The 1984 big game harvest (1985 data are not yet available) was the highest the department has ever documented.

In the 1930s, deer—both white-tailed and mule deer—were considered scarce in most of eastern Montana. In 1984, 34% of the state's deer harvest came from the southeastern quarter of the state (Region 7). This one administrative region in 1984 exceeded Montana's statewide deer harvest in any year from 1900 through 1952.

Mule deer now inhabit more than 90% of the state. The eastern Montana populations in 1983 and 1984 experienced historical highs, and the populations west of the divide were second only to those seen in the late 1950s and early 1960s. Statewide, the 1984 mule deer harvest was 112,873, almost triple the statewide harvest in 1976 and 8,500 more than the previous high of 104,300 in 1962. A review of harvest data and deer studies, along with published population literature, indicates Montana's 1984 spring mule deer population was more than 300,000 animals.

White-tailed deer are now found in every county and along every major watercourse in the state. They are most abundant in the mountainous and heavily forested northwestern corner. Like the mule deer harvest, the 1984 whitetail harvest, at 56,761 animals, was the highest ever recorded. The three next highest harvests were 40,071 in 1983, 38,700 in 1973, and 33,650 in 1957. Because of the brushy cover they prefer, whitetails are very difficult to survey. Most of our deer biologists, however, believe the harvest in most areas is less than 30% of the popula-

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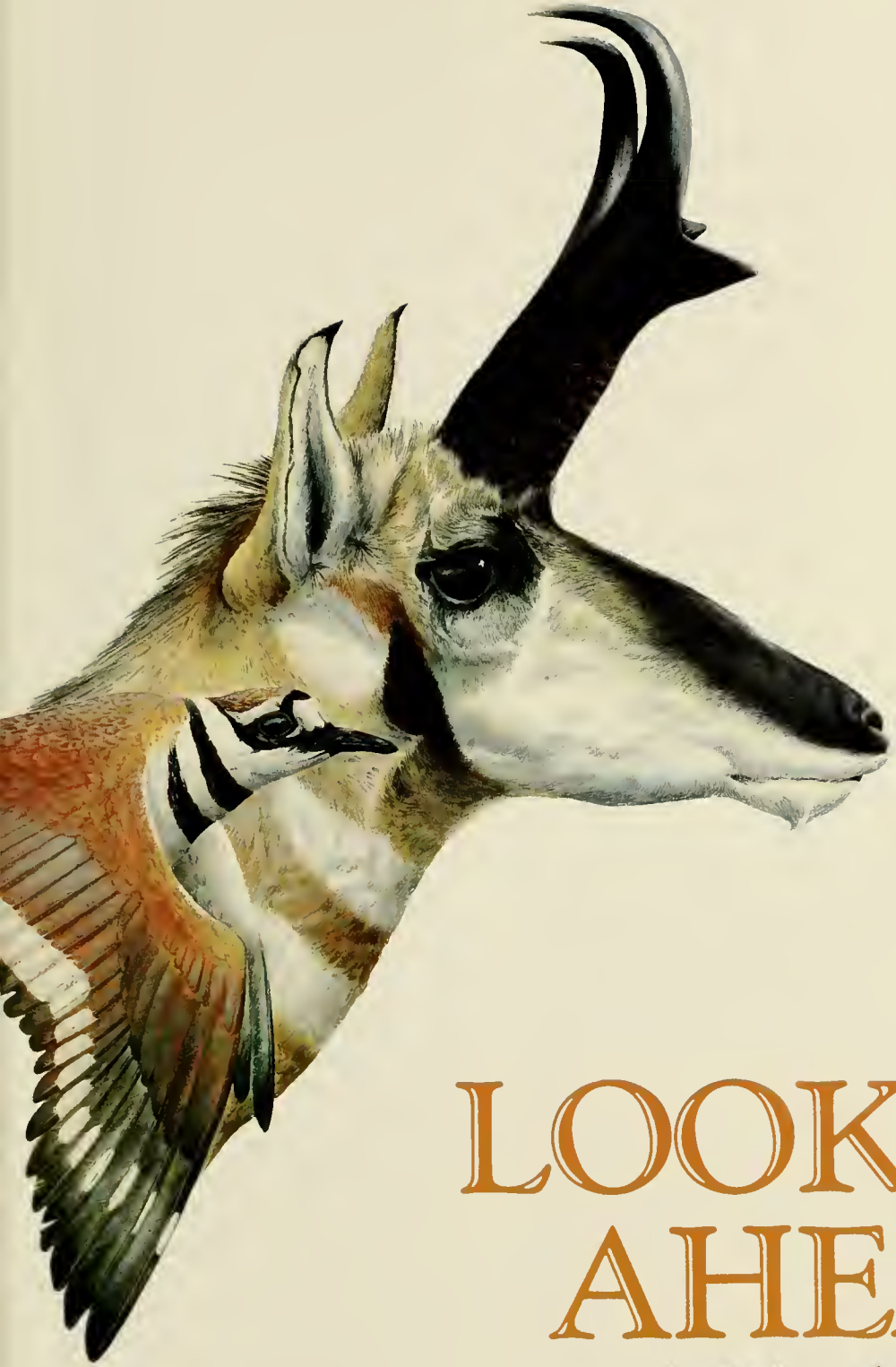

LOOKING AHEAD

by Mike Aderhold
illustrated by Dave Samuelson

tion, indicating a minimum spring population in 1984 of at least 170,000 animals.

In 1910, by all accounts, there were fewer than 3,000 elk in Montana north of Yellowstone National Park. With protection, transplant programs, and the purchase of critical wintering areas, elk have increased today to somewhere around 100,000. They now range over 25% of the state, from the wet forests of the northwest and the mountain foothills of the southwest to the broken plains of the Missouri Breaks. The 1984 elk harvest of 18,478 was 1,356 more than the previous high (1983), and came close to doubling the 1965, 1972, and 1976 harvests.

Antelope are also at or near a high for this century. They now inhabit about 41% of the state, and the 1984 harvest of 28,588 was roughly 10,000 more than the average annual harvest during the 1970s. The population has skyrocketed from an estimated 3,000 in 1924 to more than 100,000 today, despite severe losses during the hard winters of 1977-1978 and 1978-1979. The numbers of antelope permits offered in 1984 (39,080) and 1985 (38,250) were the highest ever and more than twice the number offered in 1980 (18,150).

Although black bear populations are not well documented in Montana, the best estimate is that we now have more than 10,000 animals. The mandatory tooth turn-in program authorized by the Fish and Game Commission in 1984 should lead to a better estimate of the population. Roading, forest development, and spreading civilization have cost this species some security in recent years. Black bears and mountain goats are the only two commonly hunted big game species that may have decreased in the last 20 years. As a result, management of these species has become more conservative in the 1980s.

Because of their high country habitat, mountain goats were long thought to be immune from the pressures of human encroachment. However, at a 1977 International Mountain Goat Symposium in Kalispell, speaker after speaker reported goat declines across North America. These declines were attributed primarily to increasing road access, mining and logging disturbance, overhunting, and fire suppression.

"Like it or not, we are leaving a period of dramatic big game population increases and entering a period of fine-tuning, protecting, and perpetuating what we have."

All of the 12 native mountain goat herds in Montana are located on or west of the Continental Divide. The animal has a poor reputation for pioneering new areas. Between 1910 and 1980, 350 goats were placed in 21 new locations in 12 different counties, mostly east of the divide. Today's overall population is somewhere between 4,500 and 7,500; it is doubtful that the state has ever had more than 10,000 goats, at least in the last 150 years. The mountain goat harvest in 1984 was 215; about 320 permits have been authorized in recent years.

Bighorn sheep, like mountain goats, occupy only 3%-4% of the state's area, and are found primarily on national forest, BLM, or national park land. Montana now has 34 bighorn sheep populations with herds in every administrative region. Each population has been surveyed at least once in the last three years, providing a total population estimate of 5,000 to 8,000 animals. The 1983 and 1984 harvests of 349 and 278 animals were the highest ever documented, despite a pneumonia problem that affected some of the herds along the East Front.

In 1900, moose were believed to be extinct in the Rocky Mountains south of Canada and outside of Yellowstone National Park. No moose hunting was permitted in the state between 1897 and 1945. Moose now inhabit about 18% of Montana's area, and number between 8,000 and 11,000. In 1985, 18,562 hunters applied for 616 permits in 62 hunting districts. In recent years, the annual harvest has averaged close to 500 animals. Moose management remains conservative because of the difficulty in estimating populations and illegal harvest problems.

As stated earlier, these big game population estimates are rough, but conservative. Estimating big game populations is difficult at best, but from the countless hours and millions of dollars spent over the years surveying our big game resource, we can say with certainty that today it is in good condition. The alliance of conservationists, land managers, biologists, sportsmen, ranchers, and farmers who worked together to restore a resource that was almost lost can look back with pride at this accomplishment.

Today, Montana's big game animals and its people are inversely distributed—where there are lots of animals, there are few people, and vice versa. This fact and the fact that most Montanans now live in the larger towns and cities may be partly responsible for the diversity of opinions voiced in recent years concerning the state's big game populations. For the first time in our 85-year history of striving to increase big game herds, there is now a clear difference of opinion about how many is enough. We seem to be leaving an era of unanimous support for statewide big game increases and expansion. Today there is much social, political, and economic conflict and cost involved in pushing the population curve upward as we have in the past.

We can look back for the first time in this century and say that most of the historic populations of mule deer, white-tailed deer, bighorn sheep, and mountain goats have been restored. Most of the lands now capable of supporting elk, moose, and black bear are currently inhabited by these animals. The numbers, of course, could be increased. Montana has a great capacity

to support wildlife. Early explorers and naturalists documented greater wildlife abundance than we have today. But the use and condition of the land has changed a great deal; from a practical standpoint, the options for increasing big game populations today are much more expensive than they've ever been.

Like it or not, we are leaving a period of dramatic big game population increases and entering a period of fine-tuning, protecting, and perpetuating what we have. Proposed future strategies include upgrading population trend surveys, modeling populations, and improving our ability to determine allowable harvest rates. In many areas there is talk of stabilizing deer populations and seeking incentives to interest private landowners in protecting the habitat currently available. There are also efforts to better define social and economic values of deer and elk so that the costs and benefits of various management options will be clearer to the public.

With elk, the primary emphasis will be on keeping the current habitat base from declining. It is clear that the health of elk populations is tied to the availability of key habitat components. Various land purchases, leases, easements, and exchange options are being developed for local consideration.

Most moose, sheep, and goat populations are already in areas that will support them. Their future depends on improved coordination with public land managers to control access and protect habitat. Population goals need to be refined to give federal land planners a target around which to design other activities. There is an ongoing need to improve public awareness and gain assistance in reducing the still-alarming illegal kill, habitat destruction, and organized poaching of wildlife trophies.

Montana is one of four states where wildlife matters survive as a dominant political issue (the others are Alaska, Idaho, and Wyoming). Wildlife belongs to all the residents of Montana, and just about everyone in the state old enough to drive a pickup has some opinion about how our wildlife should be managed. The variety of opinions is amazing, and today's wildlife manager needs to be an amateur psychologist as well as a biologist.

"Although population estimates are difficult to make, and can never be exact, we know by every indicator that Montana's big game populations are healthy."

Stephen R. Kellert, a professor at the Yale School of Forestry and Environmental Studies, has for the past 13 years been studying how Americans view wildlife. He has identified 10 basic attitudes toward animals and wildlife resources; these attitudes are not mutually exclusive, so an individual can hold several of them to varying degrees. Briefly, according to Kellert's findings, the attitudes are: (1) a strong attraction to wild places and wild things and a natural, primitive situation; (2) a fascination with the interrelationship between wildlife species and natural habitats; (3) a strong affection for individual animals, usually pets, that is extended to an interest in less familiar wild animals; (4) a primary concern about the practical and material value of the meat, hide, antlers, etc.; (5) a view that animals are a challenge to control and master in a sporting situation; (6) a strong interest in the artistic and symbolic characteristics of animals; (7) a fascination with the biology and physical attributes of wildlife; (8) a strong opinion about the right and wrong treatment of animals and a strong opposition to the exploitation of animals; (9) a passive avoidance of animals because of a simple lack of interest or indifference; (10) an active avoidance of animals because of fear, superstition, or dislike. All of us possess one or more of these attitudes to some degree, and they influence our opinions and perceptions of recreation quality.

Kellert also identified three types of hunters: the meat hunter, the recreational hunter, and the natural hunter. While elements of all three types might be found in a single individual, a pattern of attitudes dominates and distinguishes one from another.

The meat hunter's main objective is to bring home food. He or she believes big game should be managed for the table. This hunter consciously or unconsciously re-enacts a vestige of the American frontier tradition of living off the land. The hunt is a symbolic assertion of self-reliance and independence. Population numbers and harvest figures are important to this hunter, who tends to see wild predators as competition and views the harvest as the main measure of hunting success.

The recreational or sport hunter sees his or her experience as a competitive and social activity involving mastery of the prey animal. This hunter is tuned to the chase and often hunts according to self-imposed rules. He or she puts a great deal of emphasis on shooting and stalking skills, and is often unusually knowledgeable about arms and ammunition, backcountry vehicles, and camping and hunting gear. Antler or horn size, animal size, and degree of challenge and fun of the outing are among this hunter's measures of hunting success.

The natural hunter cites the opportunity to be outdoors and close to nature as the primary reason for hunting. This hunter is usually familiar with and aware of the natural world, and knowledgeable about plants and animals. He tends to view himself as a predator and regards his prey with affection and respect, becoming familiar with the habits, life requirements, and habitat needs of the animals he hunts. The degree of involvement, the intensity of the experience, and the opportunity to see nature in an untrammeled state dictate his measure of success.

Wild animals have various commercial, aesthetic, educational, recreational, biological, and social values. We are just now starting to measure these values and assess their relative importance. These six values mixed

with three different hunting perspectives and 10 different attitudes toward wildlife give us a clue as to why we hear so many different opinions about how the resource should be managed. It's no wonder that Aldo Leopold, one of the pioneers of professional wildlife biology, said 43 years ago that the real problem lies not with the animals but with the public: "Wildlife management is comparatively easy; human management is difficult. . . ."

Last year the DFWP sent copies of an 88-page document designed to guide the agency's program through 1990 to more than 200 individuals, 90 sportsmen's clubs, 33 agricultural groups, 22 federal agencies, 61 conservation districts, 11 state agencies, 15 conservation groups, 150 legislators, and 23 business organizations. Twenty-eight individuals and 26 organizations responded. Comments touched on a wide variety of subjects, including more management of certain species (20 comments), public access (13), specific uses of license money (8), game damage problems (6), winter range problems (5), incentives to landowners (4), and better coordination among agencies (4). There were another 106 comments on 19 other subjects. The comments were both positive and negative with some people in favor of more animals and others less. Even more opinions have been voiced at the recently held governor's forums on outdoor recreation.

The trend is for more and more people to voice a greater diversity of opinions on a wider range of subjects. Every proposed solution to a management problem seems to adversely affect some interest group, and every group seems to have the ability to hold up a management program. Progress in wildlife management is now tied to creating choices, figuring the various costs and benefits of the alternatives, explaining the situation to various interest groups, and trying to develop a consensus. This part of the wildlife manager's job has increased dramatically in recent years, partly because wildlife populations have responded so positively to management programs! Today the greatest public benefit is not always clear, and political opinion, biological facts, and economic realities must be constantly assessed.

This situation carries over into a variety of demands for more "quality" in our recreation programs. Although "quality" is difficult to define, it can be viewed as the measure by which individuals gauge their level of satisfaction. Satisfaction, in turn, can be influenced by a number of factors; to some hunters, it may be related to the number of animals available or the ease of the hunt. To others it may be the size of the horns or antlers or the weight of the animal. Still others may measure quality by the number of other hunters in the field or by the wildness of the country.

Recently, in response to some hunters' concern over a perceived decline in big bucks and trophy bull elk, DFWP biologists undertook a review of that one measure of quality. They focused on harvest statistics and the population trends of deer and elk over the last 35 years. A future article will report in detail on the findings of this study. But briefly, the data they gathered showed that there are now as many or more big buck deer in Montana than at any other time in the last 90 years. More bucks were harvested in 1983 and 1984 than in any other year during this century except 1957. The *perception* that there are fewer bucks now than in years past is valid, however, because there are more hunters and hence a reduced probability that a given individual will find a big buck. The number of deer hunters in Montana increased from 86,830 in 1950 to 164,290 in 1984, a 90% increase. The number of bucks would have had to almost double to give the individual hunter the same hunting opportunity available 34 years ago.

The elk hunting picture has also changed a lot over the last 20 years, but wildlife managers point with pride to the fact that we still have a five-week general season, and that hunter success, elk harvest, and acres of habitat are all higher than they were two decades ago. Even though greater hunting pressure and a general decrease in elk security have forced a number of hunting restrictions, the opportunity for bagging a trophy elk in many areas is still good. Biologists calculate that, of the area open to public rifle hunting, 21% offers an excellent opportunity for bagging a trophy elk, 43% good, 28% fair, and 8% poor.

Of the many factors influencing buck and bull availability, *hunting* is the only one that the DFWP can easily manipulate. The department cannot control the weather-influenced buck and fawn survival, the genetic factors, or in most cases the quality of the habitat. But the DFWP has at least eight different harvest strategies it could employ to increase the male deer population, if (1) low buck numbers in an area are due to factors that could be affected by altering the harvest, and (2) if it is desirable, from the public's perspective, to produce more males in an area. Each strategy, such as closing the season during the rut, setting a quota, going to buck permits, or limiting access, has positive and negative features.

A hunter's opportunity to see or harvest a big buck or a bull elk is directly related to the amount of effort he or she is willing to expend. Older, larger animals are usually found where cover is good and access poor. About half the deer and elk hunting districts still offer such backcountry hunting opportunities. No management strategy exists that will result in sufficient numbers of easily obtainable trophy animals to satisfy everyone, everywhere.

Managers must take into account a variety of viewpoints on what constitutes "quality," since it is obvious that it means different things to different people. As was pointed out earlier, it has more to do with a total recreational experience than with just the harvest of an animal. The department's view now is that it can best provide quality by maintaining a variety of recreational opportunities. We are fortunate that in Montana there is still room for the hunter to make a choice.

While wildlife managers have achieved enormous successes in this century, they are faced today with a new set of problems. Game populations, available habitat, vehicle access, animal security, hunting activities, economics, land management options, recreation technology, landowner tolerance, and a host of other factors are all pieces of a complicated biological and sociological puzzle. In the past, both wildlife managers and wildlife users have enjoyed the luxury of dealing with these pieces independently. But now, more and more, it will be necessary to understand how the pieces fit together so that we can help each other solve the puzzle. ■

THORNBRUGH'S "CANADAS" WINS STAMP CONTEST

by Don Childress

With his painting, "Canadas Over the Pintlers," Victor artist Joe Thornbrugh won Montana's first waterfowl stamp contest. For this first stamp, only Canada geese could be portrayed—because the "honker" is a waterfowl species highly regarded by nearly everyone.

Thornbrugh's painting was selected from 45 works of art submitted, and the contest was open only to Montana artists. The other finalists included: **Stephen C. Elliott** and **Bob Story**, Billings; **Marilyn Hughes**, Columbus; **Ron Jenkins**, Missoula; **Robert Neaves**, Corvallis; **Dave Maloney**, Great Falls, and **Jim Wantulok**, Bozeman. The eight paintings will be exhibited in various places in Montana until July.

Thornbrugh works in several mediums, but prefers acrylic since he believes it "offers the most challenges" and its vibrant colors are "most suitable for rendering the plumage of birds," his most frequent subject. He spends about half his time researching and sketching, and the other half in translating that information into paintings.

Thornbrugh's works have been exhibited at the Los Angeles County Museum of Natural History, National Wildlife Federation Headquarters in Virginia, Museum of Native American Cultures in Spokane, the Leigh Yawkey Woodson Art Museum in Wausau, Wis., the Charles and Emma Frey Museum in Seattle, and at the 1979 and 1980 National Bird Art Exhibitions. His painting of a ring-necked pheasant was shown in the National Collection of Fine Arts at the Smithsonian Institution in Washington, D.C., in 1980.

The 1985 Montana Legislature gave the Department of Fish, Wildlife and Parks (DFWP) authority to produce and sell the stamp. Proceeds from sale of the stamps, art prints, and related items to hunters, collectors, and others interested will be used for waterfowl habitat. Waterfowl hunters are re-

quired to have the $5 stamp, in addition to a federal duck stamp and a Montana game bird hunting and conservation license.

The language in the bill enables the DFWP to initiate a wide variety of programs to preserve and develop wetlands. The new waterfowl stamp program will allow the department to take advantage of Ducks Unlimited's recently announced MARSH program—an acronym for **M**atching **A**id to **R**estore **S**tates **H**abitat. The program provides matching dollars, based on a percentage of dollars raised by local chapters as part of their fund-raising activities. Other programs involving matching dollars may be forthcoming, which will make the waterfowl stamp dollars even more valuable.

When it's all put together, the result will be a solid, long-term program designed to benefit the waterfowl enthusiast.

Jim Wantulok
Bozeman

Robert Neaves
Corvallis

Dave Maloney
Great Falls

Ron Jenkins
Missoula

Marilyn Hughes
Columbus

Bob Story
Billings

Stephen C. Elliott
Billings

Fishes of Special Concern—Explanation and Update

by George Holton

Several times a year, I am asked, "What is a fish of special concern?" The answer is straightforward. It is a native Montana fish with limited habitats and/or limited numbers in the state.

The fishes of special concern list is simply a "watch list" agreed upon by the Montana Chapter of the American Fisheries Society (AFS) and the Montana Department of Fish, Wildlife, and Parks (DFWP). It includes fishes that conceivably could become threatened or endangered if their situation worsens. Recommendations for a fish to be listed, or deleted, are discussed at a chapter meeting (the chapter consists mainly of fisheries workers from various agencies and private firms involved in aquatic resource management). Changes approved by the chapter are recommended to the DFWP director for the department's fishes of special concern list.

So far, the department has adopted all chapter recommendations. This agreement gives the list an air of authority. I hasten to point out, though, the list has no force of law—it is simply a joint AFS Chapter-DFWP "watch list." It is especially useful in stream fishery classification or assessment where top points are awarded for the best habitats for Class A fishes of special concern (those of most concern). Fewer points are awarded for habitats for Class B fishes of concern. and so on.

Presently, no Montana fish is designated threatened or endangered as provided by federal or state law. However, the American Fisheries Society's list of endangered, threatened, or of special concern fishes includes pallid sturgeon as threatened, and paddlefish and Montana Arctic grayling (stream form) as of special concern. DFWP and the Montana Audubon Council have recommended that the white sturgeon (a Kootenai River fish in Montana whose population has plummeted to extremely low numbers) be designated by the Montana Legislature as a state endangered species.

The department's fishes of special concern list was formalized in 1979 (see *Montana Outdoors,* Jan./Feb. 1980) and since has been revised. See the chart for the present line-up.

The chart reflects the following changes since 1979:

(1) Westslope cutthroat trout upgraded from Class B to Class A.

When the fishes of special concern list was first developed, we thought there was a large number of pure westslope cutthroat trout populations (including populations of the upper Missouri River strain). As a result, this fish was designated a Class B fish of special concern. Since then, the University of Montana genetics lab has tested a sample of these "pure" populations using electrophoresis, a biochemical technique. It turned out that only a fraction of the populations we thought were pure, are, in fact, pure. Thus, it is appropriate that the westslope cutthroat trout be in Class A.

(2) Bull trout added to Class B.

Robb Leary of the UM genetics lab has detected hybrids between the bull trout, a Montana native, and the brook trout, a non-native. Both species are in the genus *Salvelinus.* Apparently crossbreeding readily occurs and almost all the hybrids are sterile.

Our computer data file indicates that 40% of our bull trout streams also have brook trout, and that brook trout are often the dominant species. In this situation the brook trout is investing proportionately less in sterile mating than the bull trout is. Through time, due to this factor alone, it is possible for the brook trout to replace the bull trout. This hybridization may be an important cause of the decline of bull trout in Montana.

(3) The shorthead sculpin downgraded from Class B to Class C.

When this species was first included on the "special concern" list, available information indicated it had quite limited distribution in the northwestern United States and British Columbia. Recent information indicates it is more widespread and, therefore, more properly in Class C.

(4) Pearl dace added to Class C.

According to our stream data base, the pearl dace is common in only two streams, uncommon in one stream, and rare in four other streams. Its presence is expected, but not verified, in two additional streams. Although the pearl dace is also known to reside in lakes, there are no records of it in our lake data base. Class C fish of special concern status should result in seeking this species during routine surveys and may uncover additional populations. Until more populations are found, it deserves at least Class C status.

(5) The finescale dace dropped from the fishes of special concern list.

This species was added to the first list on the assumption it was in Montana, although none were in our official collection. Since then, searches to find pure finescale dace have been unsuccessful. We now believe it has not been present in the recent past and

MONTANA FISHES OF SPECIAL CONCERN

Class A—limited numbers and/or limited habitats both in Montana and elsewhere in North America; elimination from Montana would be a significant loss to the gene pool of the species or subspecies.

White sturgeon (*Acipenser transmontanus*)
Pallid sturgeon (*Scaphirhynchus albus*)
Paddlefish (*Polyodon spathula*)
Yellowstone cutthroat trout (*Salmo clarki bouvieri*)
Westslope cutthroat trout (*Salmo clarki lewisi*) —includes upper Missouri cutthroat trout
Arctic grayling (*Thymallus arcticus*)

Class B—intermediate between classes A and C. Limited numbers and/or limited habitats in Montana; fairly widespread and fair numbers in North America as a whole. Elimination from Montana would be at least a moderate loss to the gene pool of the species or subspecies.

Native rainbow trout (*Salmo gairdneri*)
Bull trout (*Salvelinus confluentus*)
Sturgeon chub (*Hybopsis gelida*)
Sicklefin chub (*Hybopsis meeki*)

Class C—limited numbers and/or limited habitats in Montana; widespread and numerous in North America as a whole. Elimination from Montana would be only a minor loss to the gene pool of the species or subspecies.

Shortnose gar (*Lepisosteus platostomus*)
Pearl dace (*Semotilus margarita*)
Northern redbelly dace (*Phoxinus eos*) x finescale dace (*P. neogaeus*)
Trout-perch (*Percopsis omiscomaycus*)
Shorthead sculpin (*Cottus confusus*)
Spoonhead sculpin (*Cottus ricei*)

therefore does not qualify as a fish of special concern.

(6) Redbelly dace-finescale dace hybrid added to Class C.

As mentioned above, the finescale dace has never been recorded for Montana; however, the redbelly-finescale hybrid has been found in several Missouri River tributaries. Also, the redbelly dace is fairly common in Montana east of the Continental Divide. Dr. Fred Allendorf, UM geneticist, wrote in a 1974 letter, ". . . There is indirect evidence that this hybrid is a parthenogenetic species [reproduction by development of an unfertilized ovum] . . .

"A hybrid parthenogen is truly a separate biological species and deserves species recognition for preservation . . .

". . . The northern redbelly-finescale dace hybrids in Montana should be protected at least until their parthenogenetic reproduction is confirmed or refuted. . . ."

We have a new ally in our deliberations on what should and should not be a fish of special concern—The Nature Conservancy. The pearl dace and finescale dace-redbelly dace hybrid, newcomers to the 1985 list, were suggested as candidates by the Conservancy. Also, the recently created Montana Natural Heritage Program, a cooperative effort of the Conservancy and state government (with some funding from federal agencies) will employ a global and state ranking system to identify plants and animals needing attention. These will be inventoried and tracked with information kept in a constantly updated data base. The data base will be available to all: government agencies, private companies, and individuals.

States with established National Heritage Programs have found this ready source of authoritative information has not only protected the environment, but also has reduced conflicts and saved considerable money by providing data that would have been costly to procure for forest planning, highway routing, subdivision siting, and the like.

Our fishes of special concern effort will mesh nicely with the National Heritage Program. We will work together toward a common goal.—*George Holton, assistant administrator, Fisheries Division*

Colley Makes History

When Emmett Colley began his career with the state Fisheries Division in Great Falls, the voices of two guys named Crosby and Sinatra were topping the charts, "swing" and Fred Waring's band were "in," Hudsons and Nashes cruised Montana's byways, and the bombing of Pearl Harbor had not yet etched its infamous place in history.

But when he retired from the Department of Fish, Wildlife and Parks on Dec. 31, 1985, Colley had etched his own sort of historical mark. Through his 44-year, 11-month association with the department, Colley earned the distinction of being not only the longest term employee in the department's history, but also the employee with the most years of continuous service in the history of Montana state government.

GENE FISCHER

Emmett Colley

Colley began his work for the department as a fish culturist at the Great Falls (Giant Springs) Hatchery on Feb. 1, 1941. Over the next three and a half decades, he would be transferred to Anaconda as a hatchery worker; to Emigrant, Lewistown, and back to Great Falls as the assistant hatchery manager at each; and then to the Bluewater Springs Hatchery south of Laurel where he served as hatchery manager for 26 years.

But even after 35 years with the Fisheries Division, Colley still hadn't had enough of the resource he loved. In 1977, he became hatchery bureau chief for the Fisheries Division at the department's headquarters in Helena, a position he held until his retirement.

To recognize his many years of service to the state of Montana and to the department—as well as for his career-long contribution to making Montana's fisheries the splendid resource they are today—Colley was honored by the Montana Fish and Game Commission at its January meeting and also at a retirement reception and dinner.—*Bill Phippen, Region 8 (Helena) information officer*

Foundation Supports Elk Research

The Rocky Mountain Elk Foundation, with money generated from the San Diego Chapter of Safari Club International, has donated $3,000 to the Department of Fish, Wildlife and Parks to support the department's elk projects.

According to Glenn Erickson, special projects bureau chief in DFWP's Wildlife Division, the money will be used to bolster funds for two current elk projects—one in the Gravelly Mountains in southwestern Montana and the other in the Clark Fork River drainage.

Based in Troy, Mont., the Rocky Mountain Elk Foundation is a private, non-profit organization dedicated to the sport of elk hunting, the science of elk management, and the preservation of elk.

Take A Peek Inside

It's okay to judge this book by its cover, but we think you'll be even more impressed if you take a peek inside.

The book we're talking about is the "Montana 1986-1988 Fishing Regulations," and you'll be surprised when you pick up your copy because it looks nothing like its predecessor.

For a start, the format is handy. At 4½ by 9 inches, it will fit neatly into your pocket or tackle box.

For another, it's printed in black and white, except for a color fish identification guide. With big, bold listings, it's easy to find the information you seek. The guide divides Montana's waters into three regions—western, central, and eastern—and presents standard fishing regulations and possession limits for each region, plus exceptions. The exceptions are listed alphabetically, so you won't have to fumble with a huge, ungainly sheet of paper to find the rules for Plimpton Creek in Beaverhead County (it's in the Big Hole drainage, and it's open the entire year for brook trout). The need to provide sportsmen with regulations that are easier to use than those published in the past was one of the major rationales behind producing the 1986-1988 regulations in a booklet format. Because of special regulations, the guide also contains individual maps of the Big Hole, Bighorn,

Madison, Yellowstone, and Smith rivers.

The booklet brims with easy-to-follow information about general fishing license requirements and fees, how to release fish, what are wild trout, why there are "special regulations" on some waters, use of the "Fisherman's Log," what you should do if you catch a fish with a numbered tag on it, and much more. The section on "Standard Statewide Fishing Regulations" summarizes daily and possession limits, in addition to presenting information on seasons, lures and bait, checking stations, fishing hours, ice fishing shelters and size of hole, game fish, means of taking, children's fishing waters, and other items. There's also a list of "don'ts"—activities that are unlawful.

One of the questions you're bound to ask is: "Do these new regulations cost more than the old regulations to prepare?" The answer is, "Yes, per copy they do." But as Al Elser, former management bureau chief in the Fisheries Division, points out, fishing regulations don't change that much, so the guide will be good for two years.

"In the past, we published regulations in a tabloid newspaper form every year," he explained. "But now, with the new booklet format, fishermen will have regulations that are easier to understand and easier to handle. We hope folks will hold onto their copies and use them for two years."

Pick up your copy at license agents, regional Department of Fish, Wildlife and Parks offices, or from the Helena headquarters—then take a peek inside.—*Kay Ellerhoff, associate editor*

BOOK REVIEWS

MONTANA WILDERNESS—Discovering the Heritage, by Steve Woodruff and Don Schwennesen, photographed and designed by Carl Davaz, with map design by Kirk M. Johnson, The Lowell Press, 115-31st St., P.O. Box 1877, Kansas City, MO 64141; 1984, 116 pages, $25 hard cover.

If the wilderness experience is something you enjoy—either by visiting wild places on foot or horseback, or if you are among the majority of wilderness supporters who vicariously experience the call of the wild through television, in sharing the exciting tales of friends, or from the pages of outdoor magazines—"Montana Wilderness" is for you. This book presents not only an exceptional history of Montana's 15 wilderness areas, but it also reveals the character of each through colorful accounts of the people, wildlife, and events shaping it.

From the grottoes and palisades of the Gates of the Mountains and the eternal whisper of wind through the grass in the UL Bend, to the sweeping expanse of the Bob Marshall complex, "Montana Wilderness" takes the reader into remote, breathtaking, spiritual places. Through its poetic prose, it creates a sense of awe, reverence, and pride in the fabulous country Montana offers.

An inspirational, compelling preface by Donna Metcalf reveals her dedication to wilderness. Each chapter develops a theme pertinent to wilderness: what it is, how to manage it, wildlife, economics. The book explores the controversy surrounding wilderness designation in the competition for minerals, timber, and energy, as opposed to the value of watershed, space, and solitude.

An informative "Exploring the Wilds" section presents wilderness maps and describes some of the more popular trips within each wilderness area. Helpful tips suggest the number of days you should allow for your trek, trip mileage, elevation gain, pertinent U.S. Geological Survey maps, and the best times of year to go adventuring in each area.

If for nothing more than its exquisite photography and beautiful design, "Montana Wilderness" should be within easy reach to spirit you away into the land of the wild.—*Gayle Joslin, fish and wildlife biologist, Wildlife Division, Helena*

THE NEW COMPLEAT ANGLER, by Stephen Downes, illustrated by Martin Knowelden, Stackpole Books, P.O. Box 1831, Cameron and Kelker Streets, Harrisburg, PA 17105; 1983, 176 pages, $24.95 hard cover.

To commemorate the tercentenary of the death of the patron saint of angling, Izaak Walton, and to fill a gap in the literature dealing with one of America's favorite pastimes, Stephen Downes has written "The New Compleat Angler." Walton was enchanted by the wonderful nature of fish and their extraordinary lives, and his work, "The Compleat Angler," was published well over 300 years ago. Downes has captured the craft of fishing and the mysteries of fish in a delightful work. The book weaves together a refreshing tale of angling experience and biological information on fishes.

Each chapter combines life history details with a complete, yet understandable, description of a specific anatomical feature. A section dealing with relics of the Ice Age presents a comprehensive description of zoogeography of present-day fishes and how their modern distribution is related to the past. The presence of a lateral line on a fish is as common knowledge for students of fisheries biology as peanut butter and jelly; yet Downes provides insight and understanding of the functions and processes of the lateral line that bridges the gap between laity and biologist.

Further spice is added in the form of angling trivia and dry humor. For example, it was Thomas Barker, an ancient practitioner of the art of angling and whose work preceded Walton's by a couple of years, who first used a swivel to keep his line from twisting.

Books dedicated to the art of angling today are almost universally specialized, dealing with a single species and/or angling technique. Here, however, is a book that looks at the wide spectrum of freshwater fishing. While many of the species discussed (bream, tench, and roach) are British or European, the descriptions are excellent. Some of the angling philosophies are contrary to today's trend of special regulations; yet, it reminds us that we aren't the only fish managers. It's a delightful book which makes good reading for anyone with a passing to deep interest in fish and angling.—*Al Elser, Region 1 (Kalispell) supervisor*

MONTANA'S EXPLORERS—The Pioneer Naturalists, by Larry S. Thompson, Montana Magazine, Inc., P.O. Box 5630, Helena, MT 59604; 1985, 109 pages, $13.95 soft cover.

Most Montanans are familiar with the exploits of Meriwether Lewis and William Clark, whose "Corps of Discovery" laid the groundwork for wide-scale exploration and eventual settlement of the West. But how many people are aware of the many explorers who followed in their footsteps, and whose diverse backgrounds, interests, motivations, and accomplishments are fascinating stories in their own right?

Larry Thompson has done a masterful job of tracing the paths of several of the most influential explorer-naturalists who traveled present-day Montana between 1805 and 1864. He acknowledges that some of them, like David Thompson, Father DeSmet, and John Palliser, would perhaps not be called naturalists by today's standards, but they did contribute to our knowledge of Montana's flora, fauna, and geography.

The book begins, logically enough, with the Lewis and Clark Expedition and proceeds chronologically up through 1864, the year Montana became a territory of the United States. The author summarizes the itinerary of each explorer, but dwells primarily on natural history observations. Each chapter is lavishly illustrated with color photographs, historic paintings and lithographs, and a map. The photos are excellent, and fans of artists Karl Bodmer and John James Audubon will be especially pleased with the artwork reproductions. A bibliography is included at the end of each chapter for those who wish to delve more deeply into the historic details. All in all, the book provides a chance to view Montana through the eyes of those who saw it before the onslaught of civilization—a time when grizzly bears and vast herds of elk and bison roamed the Montana plains. This fascinating glimpse into Montana's past is well worth the price of admission.—*Dave Books*

CONTRIBUTORS

• Looking back is comparatively easy. Wildlife managers have facts, figures, information on weather, results of how a controversial issue turned out. "Looking Ahead" is another matter. **Mike Aderhold** writes: "Wildlife managers have made great strides in restoring Montana's big game populations, but tomorrow's biggest challenge may be coping with increasing recreational demands." He notes Montana is one of a handful of states where wildlife is still a dominant political issue, and the variety of opinions people hold on the subject is astounding. To understand more fully how pieces of this complex puzzle fit together, turn to page 2. Aderhold is the department's information officer in Kalispell. The article was adapted from a speech, "The Future of Wildlife Management in Montana," which he presented at the Montana Wildlife Federation's 50th Anniversary Meeting in Missoula.

• We're pleased to welcome the work of Missoula artist **Dave Samuelson.** The two paintings used in this issue are part of a series dealing with relationships between some birds and animals that share a common environment. As Samuelson observes: "Evolution, and the ecological checks and balances necessary for survival, has brought them to their respective places and, as such, has often given them some remarkable physical similarities." His observations come from firsthand experience: He works as a guide in the Big Hole country of southwestern Montana. His work has been shown at the C.M. Russell Auction in Great Falls for the past three years; at The Hole in the Wall Gallery in Ennis, the Roche Jaune Galerie in Livingston, Magic in Missoula, and at several out-of-state galleries. For more information, contact him at 4413 South Seventh St. W.; Missoula, MT 59801 (406/728-0993).

• It's an unusual depiction of Canada geese, but its uniquenesss grabbed the judges' eye and earned for Victor artist Joe Thornbrugh the right to have his work on Montana's first waterfowl stamp. As **Don Childress** notes in his article, Thornbrugh's painting and those of the other finalists will be shown throughout Montana until July. A tantalizing preview begins on page 8. Childress is the department's statewide waterfowl coordinator.

• It was "A Thousand Winters Ago," and times were lean for early Plains dwellers at a site along the Missouri River that has come to be known as Lost Terrace. Discovery of a prehistoric "garbage dump" led archaeologists to the conclusion that these native peoples had used pronghorns rather than bison, the predominant food staple. **Les Davis** brings to *Montana Outdoors* readers another of his "Moments in Montana Prehistory," and it's a fascinating, readable moment. Davis is professor of anthropology at Montana State University, Bozeman, and serves as an associate curator of anthropology and archaeology for the Museum of the Rockies. Turn to his article on page 15.

• Illustration for Les Davis' article was provided by **Bob Edgar** of Cody, Wyo. Edgar is an established western artist who sells his work all over the country. He is also an archaeologist and historian. He and his wife, Terri, operate Trail Town in Cody.

• Bioeconomics. It's a word many people don't know or understand, and many others wish it would simply go away. **Patrick Graham** takes great pains to explain economic values and why they are important to each of us: "The issues facing society—as with those we face in protecting and providing hunting and fishing opportunities—are becoming more complex with each passing year. Economic values can't solve the problems, but they provide an index to gauge the relative value of opportunities gained, and opportunities lost." Turn to "A Reflection of Choices" on page 20. Graham is chief of the research and special projects bureau in the department's Fisheries Division.

• Dollars are part of economic considerations. **Robert Spannring's** illustration, prepared especially for Patrick Graham's article, is about as apt as it could be. It ties together the diverse components of trying to "value" fishing and hunting. Spannring's work has been seen in our pages many times, a tradition we hope will continue. He is focusing on small showings, and his serigraphs, posters, oils, pastels, and pen and inks can be seen by scheduling a private showing: P.O. Box 1055; Livingston, MT 59047.

• "It Don't Get No Respect" pretty well sums it up—that's the attitude most fishermen have toward Montana's mountain whitefish. But **John Fraley** leaps to its defense, and even goes so far as to call it "Montana's most underutilized and overlooked sport fish." He further conjectures: "If the fishing public were more aware of all the good qualities of mountain whitefish, Montana's streams and rivers might be lined with enthusiastic anglers plying the waters for these neglected fish." Fraley tells readers how to catch them, and provides tasty whitefish recipes. Fraley is special projects manager for the department in Kalispell. His article begins on page 27.

• **Ruth Greenup** already knows that "Whittecar State Recreation Area" is a "Popular Spot." It offers rifle ranges, a pistol range, a silhouette range, and a "roving range" for archers. It has heated shelters and benches for reloading enthusiasts. Located near Hamilton, it draws over 3,500 sportsmen annually. Greenup has been secretary-treasurer for the Whittecar Rifle, Pistol, and Archery Range for six years and she was also instrumental in the range's development. She settled in the Bitterroot Valley in 1927 and has been active in the Hamilton Women's Gun Club for many years—as the number of marksmanship trophies on her wall illustrates. Turn to her article on page 30.

• Gertrude Hurlbutt of Dayton, Mont., throught up "A Name for the Game." Where it was invented—Massachusetts—it was called "shooting around the clock." In a magazine contest in 1926, Mrs. Hurlbutt's name of "skeet" was picked as the winner out of 10,000 entries submitted. Our "Perspectives" department features an engaging story about this event by **Jean Walker,** Spokane. There's even a bit of curious coincidence: Nancy Staton, who grew up next door to Mrs. Hurlbutt in Dayton, went on to become Montana's first 100-straight female skeet shooter. Walker is a free-lance writer, poet, and columnist who reports regularly for *Shotgun West, Trap & Field, Skeet Shooting Review,* and *The Skeeter.* Her article begins on page 32.

• Since they are small, lots of people call them "bugs." Correctly, however, they're called "arachnids" and this "Eight-Legged Predator" has a fairly shady reputation. Turn to page 34 for the "straight goods" on spiders. **Lisa Mathis Butler** confesses she is one of those ordinarily reasonable people who becomes slightly irrational if she accidentally confronts a spider. She holds degrees in park management from Colorado State University and Clemson University, South Carolina; she is a doctoral student in geography at the University of Oklahoma. Co-author **G. Wesley Burnett** was formerly employed with the Parks Division of the Montana Department of Fish, Wildlife and Parks. He is associate professor of recreation resource management at Clemson, and his research investigates use of parks in conservation of biological resources.

• *MO* wishes to thank the following photographers for their contributions to this issue: **Harry Engels** and **Mike Logan,** Helena; **Dave Tylka,** Arnold, Missouri; and **Paul Updike,** Townsend.

Portrait of a Missouri River pronghorn by Swiss artist Karl Bodmer, painted in 1833 (courtesy of Joslyn Art Museum; Omaha, Neb.).

MOMENTS IN MONTANA PREHISTORY

A Thousand Winters Ago

by Les Davis

After breaking camp on a foggy July morning in 1975, the leadoff survey crew loaded up and headed on down the Missouri River by johnboat. We were searching for evidence of archaeological sites eroding out of riverside terraces. Well downstream from the jump-off point at Virgelle, Mont., we spotted a buried but eroding prehistoric midden, a garbage dump. Standing in one of the boats, the rising sun in his eyes, project co-supervisor Steve Aaberg from Bozeman used binoculars to inspect the shadow-obscured north river bank. Twelve feet below the sagebrush-covered surface of the cutbank, he saw what turned out to be a thin, horizontal layer of mammal bones, mixed with fire-broken rocks and wood charcoal.

Stopping and going back to check it, Aaberg recognized the bones as those of North American pronghorns. This remarkable find was especially interesting since we hadn't expected to find any pronghorn kill or processing sites north of Wyoming and the Great Basin—where the hunting of pronghorns was traditional, even during prehistoric times.

The fieldwork that followed at the Lost Terrace archaeological site, and analyses of certain excavated remains, have since taught us much about this previously unknown type of prehistoric site in Montana. Trying to understand the procurement of pronghorns rather than bison, the predominant food staple of early Plains dwellers, has posed intriguing research questions.

The almost single-minded reliance by Plains Indians on the American bison is widely known. Bison provided considerable food, and the bones, horns, hooves, sinew, and hides afforded a hardware-store repertoire of essential raw materials. The special relationship between bison and early humans—that of prey and predator—began at least 11,000 years ago on the High Plains, ending when bison narrowly escaped extinction in the late 1800s.

That long-term dependency on bison notwithstanding,

A prehistoric garbage dump proves that pronghorns helped sustain early Plains dwellers.

Plains herbivores such as the pronghorn were essential to support human life, especially during unexpected food shortages. Summer droughts that caused bison to abandon their customary winter range in river valleys led to predation by hunters on lesser local prey species. Such adaptations to short-term (or even to protracted climatic fluctuations) involved hunters turning to pronghorns, deer, elk, and bighorn sheep for food.

Plains bison hunters were familiar with the peculiarities of pronghorn behavior and that of other medium-sized and larger species. Of the potential Plains prey, pronghorns were co-dominant with bison. Both are gregarious herbivores that periodically congregated in large herds, pronghorns during the winter. Pronghorns were much smaller than bison so they provided less meat, smaller hides, and fewer raw materials for toolmaking.

In the course of bison drives, pronghorns were occasionally killed by becoming entangled in the stampeding bison herd and falling to their death from a precipice. However, selection of pronghorns as the main prey by regional prehistoric hunters was first documented when the Montana State University (MSU) group identified, recorded, and began to study the Lost Terrace site in 1975.

That year, the Bureau of Land Management (BLM) was expecting that the Missouri River, from Fort Benton to the western end of Fort Peck Reservoir—the last free-flowing reach of 149 river miles—would be designated by Congress as a National Wild and Scenic River. The BLM contracted with MSU personnel to identify and record prehistoric and historic sites in this area. We also surveyed possible locations for recreational developments off the river, anticipating stepped-up visitation by recreating river users. An archaeological survey of part of this area by the River Basin Survey of the Smithsonian Institution in 1962 had recorded 55 archaeological and historical sites between Fort Benton and Armells Creek, a distance of 160 river miles.

MSU fieldwork by boat and on foot began in late spring of 1975 at Virgelle and ended two weeks later and 128 miles downriver at James Kipp State Recreation Area. We recorded 129 heritage sites in the eroding floodplain and on adjoining river terraces and slopes. Five important sites, including Lost Terrace, were test excavated to assess their importance and to provide knowledge about early human settlement patterns and resource use in the river valley.

Lost Terrace had been partly destroyed by the scouring action of ice jams, erosion of underlying sands, and by slumping. Radiocarbon dates on wood charcoal from the midden dated the remaining deposits during the Late Prehistoric Period, about 1,000 years ago, where they were later buried by alluvium from intermittent flooding.

Jack Fisher, a doctoral student in anthropology at the University of California-Berkeley, determined that demolished bones and lower jaws retrieved by excavation represented a minimum of 27 adult and subadult and 10 unborn pronghorns; his estimate was based on counts of lower foreleg bone fragments and ankle bones. Modern pronghorns in the Missouri Breaks are born from May 15 to June 1, after a 252-day gestation. Since the fetal pronghorns at Lost Terrace were short of full-term by three to four months, they died in mid- to late winter, according to Michael Wilson, cooperating zooarchaeologist at the University of Calgary.

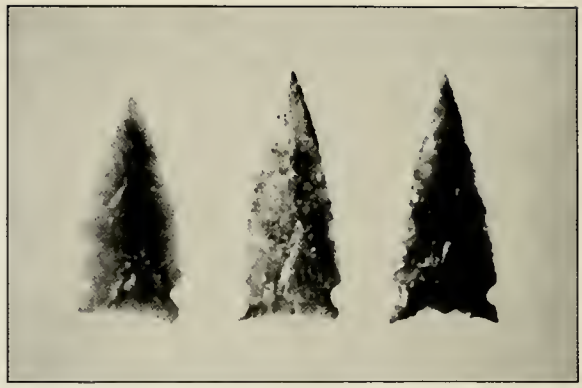

Fig. 1—Arrow points produced and used by Avonlea Complex bowmen are quite small, symmetrical, and thin. The shallow side-notches were placed low on the point above the base, consistent with the Avonlea notion of the ideal arrow point (MSU photo).

Fisher, my co-worker in the long-term Lost Terrace research project, also identified a butchered white-tailed deer hock joint and bones of a single bison. Wilson identified the broken bones of a crow-sized bird. The deer, bison, and bird remains are regarded as scavenged carcass parts discarded at the site. Shells of a half dozen freshwater clams were mixed among the bones and heat-fractured rocks that comprise much of the "garbage" deposited at Lost Terrace.

Research shows that the lives of a small herd of wintering pronghorns were taken by prehistoric hunters. Thin, lightweight, shallowly side-notched, delicately symmetrical, triangular arrow points (Fig. 1) found at Lost Terrace are identical to points produced by flint knappers of the Avonlea Cultural Complex in the Northwestern Plains of North America.

Recognized and first dated at about 1500 B.P. (years before present, A.D. 1950) at a bison kill site near Avonlea, Saskatchewan, these distinctive arrow points have since been traced throughout the Plains and Rocky Mountains of Montana. The Avonlea Complex is characterized as small, extended-family groups of semi-nomadic hunter-gatherers who exploited various game and other resources seasonally, but who usually relied on bison in both plains and mountainous areas. The Avonlea arrow point is widely accepted as evidence for the arrival of the bow and arrow in the Northern Plains, following its introduction into the Americas from Asia. Those who used Avonlea points were succeeded by peoples who continued to use bows and arrows for hunting, who occupied a similar area, and who pursued bison successfully.

That Avonlea hunters were adept with the bow and arrow is evident at many sites where bison were driven off steep cliffs or into corral-like containments constructed below short drop-offs or at the end of grassy swales. The Timber Ridge bison kill site south of Chinook, on the north slope of the Bearpaw Mountains 50 miles northeast of Lost Terrace, is an excellent example. There, bison were driven across level terrain into a circular impoundment formed by posts imbedded in the ground; poles lashed horizontally between the uprights completed the trap. Bison killing at Timber Ridge occurred about 1000 B.P., around the time that pronghorns were exploited at the Lost Terrace site. Unfortunately, the season when the Timber Ridge Avonlea bison kill operated cannot now be determined since the deposit was destroyed by

artifact collectors some years ago.

We cannot know directly the manner in which pronghorns were procured for use at Lost Terrace. We do know that historic Montana Indians such as the Flathead, Blackfeet, Assiniboine, and Northern Cheyenne obtained pronghorns in various ways: by stalking and ambush; by driving or luring them into prepared pits or corrals; by intercepting them along well-established trails, or while they were swimming a river or crossing a frozen river.

Today, pronghorns in the area disperse into local groups in the autumn, but band together in winter to form herds of 20 to 100 animals. Bucks join the doe-fawn herds after extreme weather sets in. As snow covers feeding areas, pronghorns move to exposed ridges where vegetation is still accessible or down into breaks, coulees, or onto the valley floor of major drainages. Browse (big sagebrush, fringed sagewort, silver sagebrush, rabbitbrush, and other species) comprises up to 98% of their winter feed.

Winter-weakened pronghorns could have vacated the prairie uplands in search of the sheltering gullies and box canyons behind Lost Terrace. They probably tried to find browse and respite from bitter winds at a south-facing location. Well-traveled trails down from the uplands, which crossed the river near Lost Terrace, would have funneled moving pronghorns close by. Bob Ottersberg, cooperating soil scientist from Bozeman, suspects that the river was exceptionally shallow at that particular point and it may have been a crossing place for herds of pronghorns (Fig. 2) during all seasons.

"The pronghorns [at Lost Terrace] served a life-giving role in an emergency situation by providing food for people endangered by severe weather and winter famine."

In spite of their keen sight, acute sense of smell, and great speed, pronghorns were vulnerable to hunters on foot. Although pronghorns could detect moving predators at great distances, even at close range they failed to notice hunters downwind, crouched low and unmoving below the skyline. Pronghorns would approach a moving flag or scarf nervously, possibly to gain the scent and identify the intruder, thus coming within range of waiting hunters' weapons. As well, pronghorns were averse to jumping over fences and could easily be corralled. Their predictable use of certain trails and their tendency to return to locations from which they had been disturbed also allowed patient hunters armed with bows and arrows to intercept them efficiently.

We can only conjecture about the way early plainsmen took pronghorns at Lost Terrace. First, they might have ambushed pronghorns trailing northward from south of the Missouri River; the animals probably traveled in a single file along a well-used game trail. Hunters concealed behind nearby river cutbanks might have ambushed pronghorns at close range. Or, pronghorns trailing down and southward from the uplands were intercepted by hunters positioned out of sight along the trail. The animals could then have been diverted into one of the adjacent box canyons where vertical volcanic dikes served as restraining walls; they were then cut off, captured, and killed inside that natural enclosure. Silent hunters drew, aimed, and released arrows without unduly alarming the always alert but unsuspecting pronghorns. Small groups of coordinated hunters moved stealthily to get in close, approaching from downwind and waited unmoving for long periods. Effectively placed arrows brought pronghorns down quickly. Wounded pronghorns were tracked, collected, and brought back. The pronghorn carcasses were then carried to the processing site chosen conveniently next to the river.

In view of the larger populations of pronghorns and low population densities of humans in those times, pronghorns may have been even less difficult to approach, deceive, and bag than they are for bowhunters today who are equipped with more sophisticated equipment. Early hunters likely relied more on their ability to stalk, ambush, drive, and capture game than on the sophistication of their hunting equipment. We can glean only a few facts about their hunting equipment from evidence at Lost Terrace. We must infer much about most features by analogy to the bows and arrows of historic Indians. Arrow shafts were formed from green serviceberry wood or from willows. Simple wooden bows were made from ash or other durable but resilient wood backed with sinew. Bowstrings were made from twisted sinew. Three or four hawk or upland bird feathers were tied around the rear one-third of the arrow shaft to stabilize its flight. Bows and arrows were carried over the shoulder in a quiver made from otter or cougar hide.

Whatever the bows and arrows may have looked like, pronghorns at Lost Terrace were killed and exhaustively utilized by hunters using that weapon. While the breakage and shattering of major grease and marrow-bearing bones was a common subsistence practice among early big game hunters, the extent to which bones were pulverized at Lost Terrace suggests famine and severe nutritional stress. Fisher's analysis of the number of pronghorns processed at Lost Terrace was complicated by that extreme breakage: Not a single limb bone has survived intact. It is difficult to reconstruct the way in which the carcasses were skinned, dis-

membered, and cut up since most of the cut marks that reveal butchering practices have been obliterated.

Lost Terrace was primarily a food processing site, but hide preparation and stone tool production, resharpening, and maintenance were also done there. Cold temperatures would have complicated the scraping and tanning of hides into usable skins. Occasional warming by short-lived chinook winds might have eased that problem without thawing the stores of frozen, smoked, or air-dried pronghorn meat. The hundreds of pounds of fire-broken rocks amidst the discarded bones reflect use of fires to smoke hides and meat, to boil meat eaten on the spot, to extract bone grease and marrow, and to warm hands chilled by Arctic winds.

The Avonlea Complex tool kit sample recovered at Lost Terrace is remarkably impoverished—only a few tools are present, and they are small, almost miniature. Since quality stone was not abundant locally, the people used their reserve supplies sparingly. We found arrow points, knives, scrapers, a tongue-shaped core and waste flakes, a cobble chopper, a grooved hammerstone, and a broken sandstone arrow shaft smoother. All but the arrow points and arrow shaft smoother were used in food- and hide processing. The core and waste flakes are discarded by-products of stone tool production and maintenance. Sally Greiser, cooperating lithic analyst with Historical Research Associates in Missoula, was impressed by the careful, economical use of

Fig. 2—Swiss artist Karl Bodmer, while traveling as a member of the Maximilian Expedition up the Missouri in 1833, painted pronghorns crossing the Missouri River only a few miles upriver from the Lost Terrace pronghorn processing site ("The White Castles on the Upper Missouri," courtesy of Joslyn Art Museum; Omaha, Neb.).

"We cannot know directly the manner in which pronghorns were procured for use at Lost Terrace. We do know that historic Montana Indians . . . obtained pronghorns . . . by stalking and ambush."

stone when she studied those artifacts as geological products, as toolmaking raw materials, and finally as tools produced and used at Lost Terrace. That stone raw materials were in short supply and used sparingly is consistent with the late winter food shortage hypothesis presented here to account for evidence available from Lost Terrace in the 1970s.

The nearly exclusive resort to pronghorn meat and hides at Lost Terrace was likely a consequence of short-term climatic changes that had caused summer droughts. Under such conditions, bison herds that usually assembled in nearby river bottoms during the winter instead sought needed food elsewhere. They broke up into smaller herds to survive, dispersing and moving beyond the reach of a hungry, expectant people weakened and slowed by winter conditions. Impending disaster was averted because resourceful bowhunters managed to harvest a group of winter-stressed pronghorns. The carcasses obtained were utilized exhaustively to carry famished peoples through this crucial period. The pronghorns served a life-giving role in an emergency situation by providing food for people endangered by severe weather and winter famine.

Some historic Plains Indians resorted to hunting pronghorns during winter months. The Kiowa, for example, conducted pronghorn drives when food was scarce, but only during winter when pronghorns gathered in large herds. The Assiniboine hunted pronghorns and smaller game along wooded river bottoms where shelter and fuel were available, even when sufficient meat and tallow were in winter storage. It is therefore possible that events at Lost Terrace were a product of a routine, seasonally prescribed, hunting practice rather than a response to unusual environmental conditions. However, until we can find and study other Avonlea pronghorn kill and processing sites, evidence developed by Lost Terrace research may be best explained as a response to an atypical winter crisis by determined hunters.

Today, the Lost Terrace archaeological site—a unique cultural resource in the Northwestern Plains region—continues in jeopardy as erosion persistently carves that fragile floodplain. This deteriorating, significant heritage site has posed a challenge to agency administrators and cultural resource personnel responsible for its management. Investigations carried out during the summer of 1985 at Lost Terrace helped significantly to mitigate the loss of culture-bearing deposits. Prehistoric behavior at Lost Terrace is becoming better understood through research. Human life—as it was 10 centuries ago here in the High Plains—will eventually be interpreted for the public by the BLM and the Museum of the Rockies. ■

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A REFLECTION OF CHOICES

by Patrick Graham

illustrated by Robert Spannring

There is much confusion between land and country. Land is the place where corn, gullies, and mortgages grow. Country is the personality of land, the collective harmony of its soil, life and weather. . . . Poor land may be rich country, and vice versa. Only economists mistake physical opulence for riches. Country may be rich despite a conspicuous poverty of physical endowment, and its quality may not be apparent at first glance, nor at all times.

These words, written by Aldo Leopold, reflect a dilemma that also faces those concerned with conservation of fish and wildlife. How can one place an economic value on fish and wildlife? Pursuing bull elk in high country, casting a fly into a shadowy riffle, stalking a water ouzel in the rocky rushes of a mountain stream with camera in hand are experiences of value. They are not valuable to everybody. But it is difficult for those of us who *do* value wildlife in wild country to do so in financial terms. To some, the very thought of trying to affix a dollar sign to such an experience destroys its value.

We can ignore economics, but we cannot escape its influence. Despite his observation about economists, in other writing Leopold recognized the need for fish and wildlife management to make economic sense. For example, he recognized it was important to establish economic incentive for private landowners to maintain wildlife habitat.

It could be that Leopold's observations about economists were more appropriate to the 1940s. Present economic methods used to value fishing and hunting opportunities, for example, were not even developed until 1949. Since then, economists have slowly accepted these methods, but they remain pretty obscure to the non-economist. But you don't have to understand the methods to appreciate how important economics is in fish and wildlife management.

What's the first image that comes to mind when you think of economics? Most people think in financial terms—dollars and cents. There are many examples of "financial value" associated with fish and wildlife. Some are set in the market; for example, Pacific salmon sells for over $4 per pound. The mounted head of a bighorn sheep could sell for several thousand dollars.

Financial values also include the trespass fees landowners charge for the opportunity to fish or hunt. In some areas, fees for hunting big game exceed $100 per day; on Nelson's Spring Creek in southwestern Montana, it costs $30 per rod per day for the opportunity to catch and release fish. The commercialization of sport fishing also appears to be increasing. In the Midwest and South, bass tournaments offer prizes of $50,000.

The Dollar Spent

The measure most commonly used to express the value of sport fishing and hunting has been "gross expenditure" or "dollars spent." From a local or regional perspective, knowing where and on what money is spent is important. This is the kind of information important to Chambers of Commerce, travel promotion groups, and local governments concerned with profit, economic diversity, jobs, and taxes.

In 1980, the U.S. Bureau of the Census estimated that hunters and fishermen in Montana spent over $150 million. The average fisherman spent $20 per day in over 4 million fishing days, and the average hunter spent $36 per day in over 2 million hunting days. A survey of non-resident fishermen on the Madison River in 1982 found that a typical fishing party spent an average of $778 in Montana.

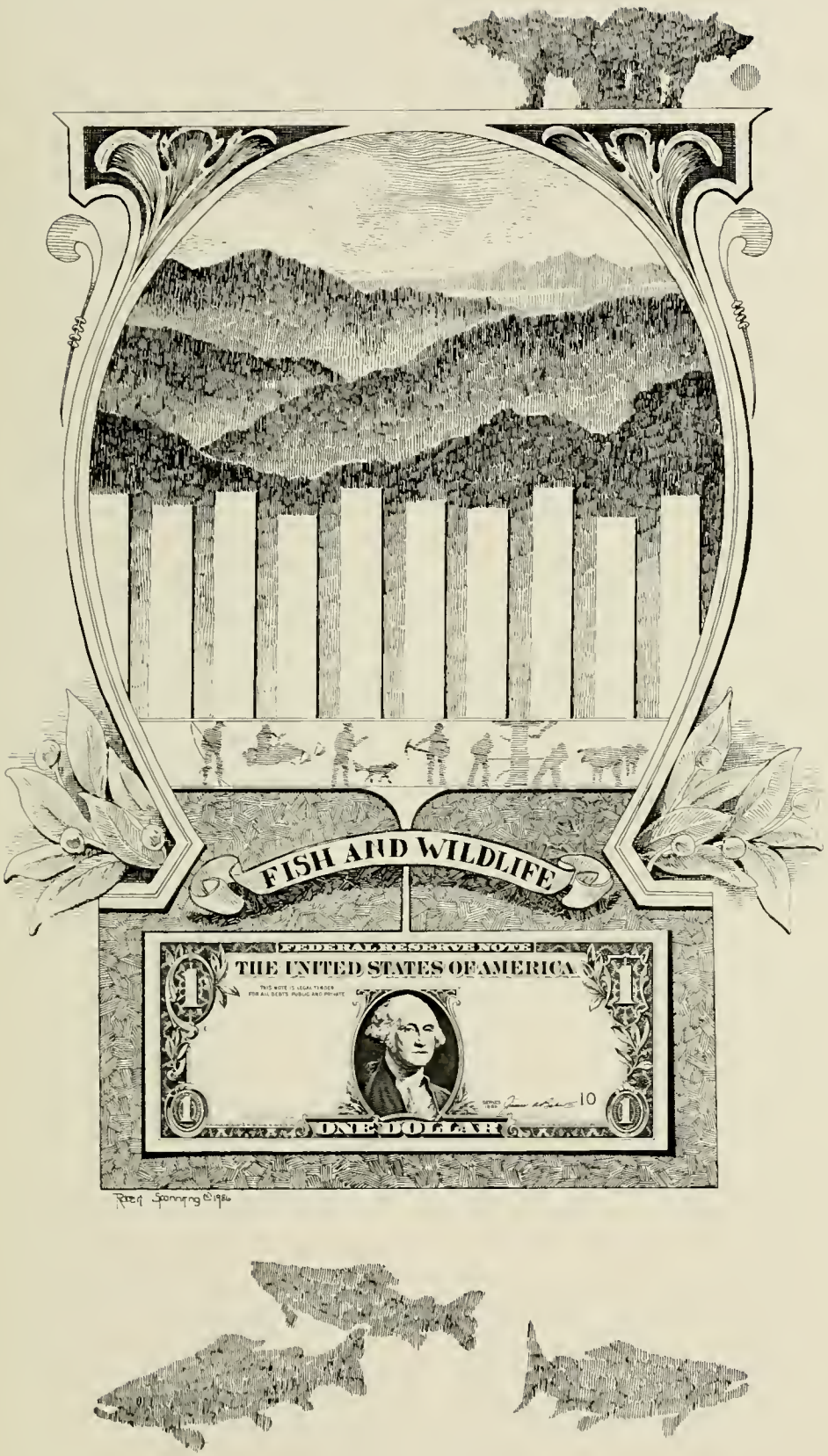
The travel industry is Montana's third largest industry. Out-of-state visitors spent $1.1 million per day in Montana in 1983. From 1979 to 1983, the number of jobs in the state's travel industry increased by 2,600. Heavy construction was the only other basic industry showing increased employment during that period.

But are these prices a fair measure of the *total value* of fish and wildlife? Dollars spent tell only part of the story. Many people have come to believe that only goods or services which can be bought or sold have economic value. This misconception happens because we often define economics too narrowly. Economics encompasses both financial and non-financial values.

Economics is a means of describing the allocation or organization of our resources and opportunities. Simply put, it is the choices we make. The *reason* we make certain choices depends on the value we place on particular goods or a service, such as a car, home, clean air, or open spaces. Some clearly have a financial value; others do not.

Beyond the Marketplace

The market has an important place. It aids in the production and dis-



tribution of such things as food, clothing, and transportation. But many goods and services are provided outside the marketplace. Society and its many institutions provide such things as our national defense system, social security, and protection against crime. The natural environment provides clean air and water, and the opportunity for quality outdoor recreation.

People in small towns and rural areas common in Montana tend to make less money and to have fewer job opportunities; but these areas usually offer a high-quality mix of non-market goods and services. The relationship linking relatively limited job opportunity and income with a high-quality community and environment is no coincidence, as pointed out by Dr. Tom Powers in a 1983 article in *Western Wildlands.*

For most of us, pursuit of food, shelter, and entertainment is at a level of quality and quantity well above what we need to survive. We are satisfying personal styles or taste—which, in turn, are functions of our aesthetic values. Some of our desires can be satisfied with money, plain and simple. Others can be satisfied only by our choices of where and how we live—and what we choose to live without.

K. Ross Toole captured some of the qualities many of us value about living in Montana in his book, "Montana: An Uncommon Land," when in 1959 he wrote:

> And whatever else has changed, the sky has not—its pale immensity in winter, its blue depth in summer, the great white fists of its clouds, and the fierce ecstasy of its sunsets.
>
> Montana is still high, wide, handsome and remote. There are many ways of looking at it and many ways of feeling about it. And there is room for all the ways.

The time and effort we spend pursuing quality of life is as economic in character as the money we spend. Looking at the "big picture," economic value can include all of these values, although some cannot be easily measured.

Many people think of fish and wildlife as symbols of quality of life. They

are owned by the people, and managed by state or federal governments for the public's benefit. For that reason, their value is not easily reduced to financial terms.

Most people recognize that fish and wildlife have value, but how can that value be compared with the financial value of producing market goods and services, such as minerals and timber, which often adversely affect fish and wildlife?

Dollars spent on fishing and hunting or on resource developments are not a complete measure of economic value. Dollars spent, after all, are a cost, not a benefit. To compare value, economists look for measures of net economic benefits.

A net economic value is a value for which one is willing to pay over and above actual expenses. For market goods, think of net economic value as the profit. If a timber company can sell a load of logs for $10,000 and it costs $8,000 to harvest them, the profit or net value is $2,000.

It is more difficult to estimate willingness to pay for such opportunities as fishing and hunting in the absence of a market. One method is to ask people what they would be willing to pay for, or for how much they would sell, the opportunity to use a certain site for fishing or hunting, above their actual expenses. For example, a hunter spent $75 in motel, food, gas, and ammunition on a hunting trip. If he would have been willing to spend up to $100 for his trip, the net value for the trip would be $25. If he would have been willing to spend only $75, there would be no net value for the trip. That does not mean he would not have enjoyed the trip; it means he paid the maximum amount he was willing to pay for that experience. If the cost to hunt was increased to $125, he would have selected another site or possibly spent his money on something entirely different.

Another method indirectly estimates net economic value using number of visits to a site as a measure of quantity and the distance traveled by the sportsman as measure of price. Other factors such as income, quality of the site, and availability of alternative sites can be included in the analysis.

Net economic values can provide a common thread in the allocation of natural resources such as timber, recreation, and minerals. For simplicity, let us assume that the harvest of timber in the example above would reduce the probability of success for a hunter or in some other way decrease the quality of the hunt. Fewer hunters would use the area, and the average value for the remaining hunters would decrease. If the total net willingness to pay by the hunters was more than the $2,000 profit on the logs, then the timber would not be cut. Other alternatives might be to redesign the timber sale, close the roads after the sale, or in some other way offset the hunters' losses.

For most people, putting a dollar sign on experiences relating to fish and wildlife is a tough assignment.

Net economic values can also be used to assess a wide range of agency actions to enhance fish and wildlife. This could include purchasing water to increase stream flows for fish, developing wetlands to produce waterfowl, or constructing new boating access sites. Evaluation of such projects predicts not only the benefits at the site in question, but also assesses how the action might affect use and value of neighboring sites of similar quality.

The value of fishing and hunting opportunities, like other goods or services, is largely a function of supply and demand. The net value of fishing on Nelson's Spring Creek may exceed $30 per fisherman per day, but that does not mean fishing in every other stream in the state has a similar value. The quality, uniqueness, and availability of a recreational opportunity are reflected in its value. If Montana were to lose half of its river fishing opportunities, the value of the remaining opportunities would substantially increase. More likely, as other states lose their quality trout fishing and elk hunting, the value of Montana's opportunities will substantially increase. For example, non-resident fishermen now make up 90% of the use on the Madison River.

Values Held by Off-Site Users

The financial and net values associated with recreational use may be only part of the economic value; let's consider some others, which are particularly important for unique and irreplaceable resources and opportunities. Economists call these "preservation values," and they are further subdivided into "option," "existence," and "bequest" values. If you hold an *option* value, you would be willing to pay to avoid irreversible loss of the opportunity for future use of a resource. If you hold an *existence* value, you would be willing to pay for the knowledge that a resource is preserved, or that an opportunity exists for you to participate in an experience even though you don't contemplate doing so. If you hold a *bequest* value, you would be willing to pay for the satisfaction that comes from knowing future generations will have the opportunity to use a particular resource. For example, many people across the country value the preservation of Yellowstone National Park, even though they have never visited it. Some want it preserved because they want to have the choice or *option* to use it in the future. Others have no plans to visit, but still value its *existence.* Those who want it preserved so future generations will have an opportunity to experience it hold a *bequest* value.

Preservation values have been estimated for water quality, air quality, wilderness areas, and unique fish and wildlife such as bighorn sheep and Pacific salmon. In the Flathead, Glacier National Park, and Bob Marshall Wilderness watershed in northwestern Montana, preservation values for water quality exceed the values placed on water-based recreation use by 20 times. Several studies have shown that preservation values are generally smaller than use values for an individual, but are larger in total because many more people value unique or irreplaceable resources than use them. If we calculated preservation values for rare or unique species of fish or wildlife, we would then have a more complete economic value and also a

continued on page 26

READERS RESPOND

You Are Invited...

It's that time of year again and
You are cordially invited
to the
RANCHERS' APPRECIATION
RECEPTION
Hosted by the
SHEEP MOUNTAIN HUNT CLUB
To thank you for your hospitality
And friendship on the great hunts
We have enjoyed in your Montana.

The above invitation resulted in about 50 people attending the annual Ranchers' Appreciation Reception at the Belltower Community Hall last October—all ages, from singles to family groups.

Fifteen years of enjoyment of the hospitality extended by Montana ranchers and townspeople was recognized as a privilege not to be ignored by our Sheep Mountain Hunt Club.

Needless to say, we do not have a "sportsman-rancher" problem. It's more akin to returning home to visit dear friends. *—Dr. David W. Kaliher; Minneapolis, Minn.*

Another Remarkable Photo Issue

Your Jan./Feb. 1986 Special Photo Issue made me downright homesick.

All of the photos and captions were great, but I was really set off by my good friend Bob Cooney's picture of the Trilobite Lakes in the Bob Marshall Wilderness. But please don't let Ron Shade's goat on page 3 tumble into the lake below—what a remarkable piece of photography!—*Marlin H. Bruner; Clemson, S.C.*

* * * * *

I just wanted to drop a short note to you to say how much both my secretary and I enjoyed your Jan./Feb. 1986 Special Photo Issue.—*Alan L. Mulkey, B&D Design & Drafting, Inc.; Missoula, Mont.*

Readers Catch Us—Twice

Loren Kovich's watercolor of cedar waxwings on the back cover of the Nov./Dec. 1985 issue of *Montana Outdoors* should have been labeled "Bohemian waxwings." The latter is easily identified by the distinctive yellow and white wing markings, and also the cinnamon-colored undertail coverts. The "cedar" lacks the wing markings and has white undertail coverts. I enjoy your magazine.—*Lester Klatt; Ennis, Mont.*

* * * * *

I'd like to inform you of a possible error in your Jan./Feb. 1986 issue of *Montana Outdoors.* On page 21, one of the photos is captioned: "Whistling swans: Allen Corneliusen." The bird in question is a trumpeter swan. I know because I have handled hundreds of trumpeter swans in my lifetime. (Incidentally, even the term "whistling" is wrong; it is now called the "tundra" swan.)

It is a trumpeter swan for the following reasons: (1) It has a red mandibular streak when the bill is closed. (2) It has a slight piece of fleshy material above the eyes. (3) It has cygnets—it is supposedly a Montana photo, and only trumpeter swans nest in Montana. (4) I even know where the photo was probably taken; however, I'll refrain from mentioning the name of the area because of possible excessive visitation by the public. (5) The habitat is not the habitat you would find swimming tundra swans in, especially tundra swans with small cygnets. *—Terry McEneaney, assistant manager, Red Rock Lakes National Wildlife Refuge; Lima, Mont.*

Game Damage Solution?

After reading Mike Aderhold's article on game damage in your Nov./Dec. 1985 issue, I would like to suggest another solution that could merit some research. This idea is based on experiments and observations as well as history.

In view of the life styles of free-roaming animals and the assumption that this wandering is due to nutritional demands, it seems logical to assume that the wandering does not start until nutritional needs are not met.

In the past, some nutritionists have suggested that the wandering and other habits of hungry animals could be controlled in two ways: First, by furnishing salt blocks; second, by fertilizing the forage to supplement all of the deficiencies.

In Montana, there has been almost no work on the use of fertilizers containing all of the trace elements and the macrominerals. Where even the most rudimentary use of this type of fertilizing has been done, the response of domestic and wild animals has been very revealing.

It seems that the problem mentioned in your article and the problem of the forage in Yellowstone National Park are closely related and could be researched together.

In addition to the nutritional question is the problem of erosion that is being checked in the turbidity tests now taking place on the Yellowstone. If research published by the Department of Agriculture and other agencies is examined, there are many examples pertinent to this problem.—*Arthur R. Cool; Livingston, Mont.*

Thief Reporters Deserve Reward

I am a subscriber to your fine magazine and have read page 11 in the Nov./Dec. 1985 issue, "Anti-Poaching Program on Line." Although I am against poaching wildlife, I am also against poaching ranchers' livestock. I am also against cow-bellied judges who seem to have a love affair with criminals.

I have a suggestion which will result in far better relationships among sportsmen, ranchers, and the Montana Department of Fish, Wildlife and Parks. Give any person who reports thieves who steal game from sportsmen or livestock from ranchers the reward of a special license in the drawing, in his choice of areas. The reward won't be exactly free, but will bring a closer friendship to all of us.—*Cliff Pearson; Augusta, Mont.*

A Wonderful Hunting Experience

Last fall I was fortunate enough to draw a Rocky Mountain bighorn sheep permit in the Beartooth Wildlife Management Area northeast of Helena. I was successful, and shot a large bighorn ram. My wife and I spent several pleasant days scouting, hiking, and hunting for my bighorn ram.

The success of this hunt was due in large part to the help and advice I received from several employees of the Department of Fish, Wildlife and Parks, namely Hubert Ellwein, manager at the Beartooth, and two other biologists in the department, Glenn Erickson and Rich DeSimone.

I owe these people a sincere thank you, along with the entire DFWP, for making this once-in-a-lifetime hunting experience possible.—*Lonis Brown; Helena, Mont.*

Nongame News

HISTORY

In 1973, the Montana Legislature passed a law requiring the Department of Fish, Wildlife and Parks (DFWP) to manage the state's nongame wildlife. This law did not include any specific funding source for management, or for education and research projects. The state has employed one nongame biologist since 1974, but due to limited funds, little is known about the state's more than 500 nongame species—birds, mammals, reptiles, amphibians, and fish not taken traditionally by hunters, trappers, or anglers.

The 1983 Legislature passed a law allowing Montanans to contribute a portion ($2, $5, or $10) of their refund to the Nongame Wildlife Program through a tax checkoff on state income tax returns. In 1985, the Legislature amended the checkoff to include those people not receiving refunds, and left a blank for those wanting to donate more than $10. Checkoff amounts are tax deductible the following tax year.

The DFWP, as administrator of the program, is using funds generated through these contributions for education and research efforts on behalf of Montana's nongame wildlife.

Money cannot be spent on the purchase of land or cannot interfere with production on, or management of, private property; any recommended projects and management actions are subject to approval by the Fish and Game Commission, with input from the public.

THE FIRST TWO YEARS

In its first two years, the nongame checkoff has been successful when judged against the performance of similar programs in other states. Total donations were $36,669 for tax year 1983, and $36,089 for 1984. Just under 4% of the eligible taxpayers donated each year; average donation was $5.34 in 1983, and $5.47 in 1984. The 1983 donation figures were about average for the 31 states with checkoff programs, but 13 states had lower rates of taxpayer participation. These included California, where only 1% of the taxpayers contributed, and Michigan, where only 2% contributed. The average donation was less than $5 in 15 other states. Montana officials are encouraged, and believe these figures indicate public support for nongame species. But continued support of the nongame program during the 1985 and 1986 tax years will be instrumental in assuring reauthorization of the checkoff bill by the 1987 Legislature.

NONGAME INVENTORIES—STATE WILDLIFE MANAGEMENT AREAS

For several years, one aspect of the research conducted under the Nongame Wildlife Program has been inventories of nongame species on department-owned lands. Nongame inventories have been conducted at Sun River, Ear Mountain, Canyon Ferry, Judith River, and Freezout Lake Wildlife Management areas (WMAs). Efforts are almost complete for the Blackfoot-Clearwater and Mount Haggin WMAs. Results of these studies have helped identify habitat relationships, numerous breeding locations for nongame birds, and new distribution records for mammals. Nongame wildlife is apparently most diverse at the Sun River Game Range and WMA which has a long history of wildlife management; diversity is lowest in the Mount Haggin WMA, an area which historically had much disturbance due to mining and logging. Results of these inventories for particular WMAs are available from the DFWP.

FLATHEAD OSPREY SUCCESS STORY

When pioneer ornithologist P.M. Silloway visited the Flathead Valley in 1900, he described the osprey as "common at Flathead Lake." Only 73 years later, biologists Doug and Don MacCarter had "grave doubts about the future of the osprey" at Flathead Lake ("Final Call for Montana's Finest Fisherman?" *Montana Outdoors,* March/April 1973). They found an osprey population of only 20 pairs. High levels of DDT, known to cause hatching failure in birds of prey, were found in addled (spoiled or rotten) osprey eggs and in fish from Flathead Lake.

Studies are currently being conducted by the DFWP, the Montana Power Co., and the Bureau of Indian Affairs to determine how the construction and operation of Kerr Dam has affected raptor and waterfowl populations. Osprey surveys in 1985 revealed a thriving population of 116 pairs, and normal reproductive success. The banning of DDT in 1972 probably played a major role in the population recovery; in addition, public attitudes and the laws have changed, reducing osprey mortality from shooting.

HARRY ENGELS

The osprey, pika, and sandhill crane are part of a diverse bunch of creatures we call nongame wildlife. Help them out by joining in the nongame check-off on your Montana income tax form.

HARRY ENGELS

HARRY ENGELS

Today, the future of the osprey in the Flathead Valley looks bright. If Silloway were alive today, he could still describe Flathead Lake as he did in 1900: "Over its clear depth the American ospreys wheel and soar, ever and anon uttering their shrill whistles, and dipping into the water for their finny prey."

BIRD DISTRIBUTION UPDATES

The original edition of "Montana Bird Distribution," published in 1974, was the first statewide summary of bird distribution and status based on one-degree blocks of latitude and longitude ("latilongs"). Through the efforts of professional and amateur ornithologists, two revisions of the original publication were compiled, in 1980 and 1985. The status of many species remains unclear, however, and certain "latilong" blocks have never been well-covered by observers. For example, an average of 215 species has been recorded in each block, but 17 blocks have totals of fewer than 200 species. In many cases, a single dedicated observer can contribute greatly to knowledge of bird distribution in the state. As an example, Chuck Carlson of Fort Peck has recorded six species there which have been recorded nowhere else in the state. His long hours afield have contributed to a high number of species for that latilong block (253 species) as compared with other adjacent blocks (170-240 species). Much remains to be discovered by those interested in exploring little-studied areas, particularly in the extreme southern, eastern, northeastern, and southwestern corners of the state.

FEATHERED JEWEL COMING BACK

The western bluebird is a shining example of how concerned citizens can become involved in nongame wildlife conservation. This beautiful member of the thrush family differs from its close relative, the mountain bluebird, by having a deeper blue plumage, and (in males) a deep-orange breast and back. Western bluebirds were once common throughout the western part of the state in open forest habitats, but by the mid-1970s, competition with European starlings and house sparrows had reduced populations to only a few pairs. Placement of nest boxes by concerned citizens produced a rapid response in western bluebird populations. In 1985, western bluebirds were sighted throughout nearly 70% of their original range, although population densities are still low. Nearly all documented nesting in the last 10 years has been in nest boxes. The DFWP encourages public participation in restoring this species in Montana. Information on construction and placement of nest boxes is available from the Nongame Wildlife Program, DFWP, Research Park Bldg., Box 5, Mon-

tana State University; Bozeman, MT 59717.

STATUS OF THE WOODLAND CARIBOU

Last July, the U.S. Fish and Wildlife Service's (USFWS) Office of Endangered Species responded to a July 1984 request to list the woodland caribou as an endangered species in Montana.

Private, state, and federal biologists have analyzed 95 years of caribou observations in northwestern Montana from pre-1900 through 1984. Since 1890, there have been 131 observations of woodland caribou in northwestern Montana. These observations ranged from tracks to actual animals. From the historic record, it appears that woodland caribou occurred in northwestern Montana until the late 1950s. The last "confirmed" sighting was in 1958 in the Yaak area of the Kootenai National Forest. The scattered bands were probably an extreme southern extension of the Canadian population. Historic and potential caribou habitat that may have once supported caribou has been dramatically altered by fire and logging during the last 50 years. Since January 1981, there have been eight "possible" sightings and two "unknown" observations.

The USFWS ruled that the petition to list the caribou as endangered in Montana was "warranted" but "precluded" by lack of information.

An interagency committee of representatives from the Kootenai and Flathead National forests, the USFWS, the Montana Caribou Project (a private group), and the DFWP will work to gather more information. An individual has been hired to follow promising leads and to map potential habitat.

The USFWS' decision on the woodland caribou's classification will be reviewed again in May 1986.

A REMINDER

It's tax time again: time for those of us concerned about Montana's wildlife resources to show support for the state's nongame species. This year, Montana taxpayers have the opportunity to donate $2, $5, $10, or more—regardless of whether they're receiving a refund—by checking the appropriate box on the state income tax form. Please take the time to talk to a friend or to your tax preparer, reminding them that donations are tax deductible. With these valuable contributions, the DFWP can plan a balanced effort to perpetuate all wildlife in Montana.

ITEMS FOR "NONGAME NEWS"

If you would like to contribute an item to a future segment of "Nongame News," contact Daniel Casey or Mike Aderhold, DFWP, P.O. Box 67; Kalispell, MT 59903.

A Reflection of Choices

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picture of how society "ranks" them. These values, however, may not reflect the benefits to society of preserving a species for genetic or ecological reasons.

Quality and Human Values

Another aspect of valuing fishing and hunting opportunities is the need to respond to the increasing diverse demands by recreationists. The economic values estimated for recreational sites and opportunities give us a sense of their worth. We also recognize that not everyone holds the same value for a site, nor values it for the same reasons. Preference information in conjunction with economic information will help us identify alternative actions and determine how various groups might be affected.

In recent years, the number of outdoor recreation groups has increased, but the focus of individual groups is often narrower. Not only are there traditional rod and gun clubs, but also groups specifically for trout fishermen, bow hunters, walleye fishermen, muzzleloaders, and others. This trend is likely to increase as competition grows for ever more limited fishing and hunting opportunities.

Some seek larger trout, trophy elk, or more walleye. Each would likely come at the expense of some other existing opportunity. As these groups become more diverse and their expectation of quality evolves, so too must new management tools evolve.

When assessing the diversity and quality of opportunities, we do so in the context of the type of people using these resources. Some are "generalists," seeking any fish, on any available gear, in any water. Others are "specialists," seeking a certain species, in select waters, during a certain season, with specialized equipment.

Fortunately, Montana still offers diverse opportunities. Whether you are after a trophy or a bag limit, for meat or solitude, with a gun or camera—there are many choices. But these opportunities are changing as the habitat diminishes and the number of people seeking these opportunities increases.

To better meet these challenges, the Department of Fish, Wildlife and Parks has initiated a statewide survey of the value of fishing and hunting. In addition to calculating economic values for fishing and hunting, the study will include a preference survey of trout stream fishermen and elk hunters. Users will be asked questions about what factors they considered in choosing when and where to fish or hunt, and what were some of the reasons they hunted or fished (to test skill; for relaxation, exercise, or solitude; to bag game; to bag a trophy, or others).

Elk hunting and trout fishing are the most complex management programs in terms of the range of quality experiences sought. As need arises, preference surveys of other groups of recreationists may be conducted.

A Reflection of Choices

The issues facing society—as with those we face in protecting and providing hunting and fishing opportunities—are becoming more complex with each passing year. Economic values can't solve the problems, but they provide an index to gauge the relative value of opportunities gained, and opportunities lost.

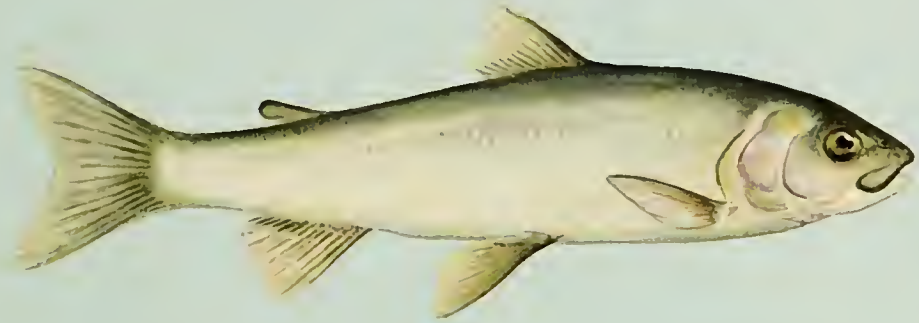
Unfortunately, many opportunities once lost—like free-flowing rivers or threatened species of wildlife—cannot be replaced when demand for them increases. We must therefore broaden our definition of economics—of values—to include these wild and natural things. They are the backdrop from and across which our society progresses. They provide the opportunity to reflect on the choices we have made, and those left to make.

Daniel Kemmis, former speaker of the Montana House of Representatives, in 1983 was writing about the end of the frontier. He wrote: "It can be remembered nostalgically, but as the memories lose connection to life, they will disappear as well."

In the same way, our perceptions about the quality of fishing and hunting are shaped by our experiences. To the degree we let that quality slip from our grasp, it too will disappear. Economics and other disciplines help us define the often diverse and dynamic views of quality. But to be successful, we must have both a vision of and commitment to maintaining the diversity and quality of fishing and hunting, of wildlands and waters, of life in Montana. ■

Montana's Mountain Whitefish:

"IT DON'T GET NO RESPECT"



GLENN WEST

by John Fraley

As I walked along the South Fork of the Flathead River in the Bob Marshall Wilderness Area, the last traces of a brilliant alpenglow faded from the peaks. I had just finished a long day of angling for and tagging cutthroat for a Department of Fish, Wildlife and Parks (DFWP) study of trout movements. I was looking forward to eating the two mountain whitefish hanging from the forked stick I carried. Cutting across a sharp bend of the river, I noticed a fisherman casting flies upstream to fish rising in a quiet pool. "Howdy!" he shouted as I approached.

"How's the fishing?" I asked, as he raised his rod, missing a strike.

"Oh, can't complain. Got enough for supper. How 'bout you?" His eyes followed my arm down to the forked stick, and a scowl began to form on his face.

"Well, actually, I'm working on a...."

"What the devil is that on your stick, son?" he interrupted. "You're not going to eat those whitefish, are you?"

I began to feel a little embarrassed. "Oh, well, you see...."

"Look young fella, I don't know where you come from, but out here those are trash fish. You can't eat whitefish—why when I catch 'em, I

PAUL UPDIKE

As this Missouri River angler can attest, the mountain whitefish is abundant, scrappy, and delectable—and worthy of much better consideration than it now receives.

whack 'em over the head and throw 'em on the bank."

Not in the mood for an argument, I thanked the man and headed for camp.

The angler's derision toward the mountain whitefish is not unusual. In fact, many people view it as a trash fish or a nuisance and would never consider keeping one for dinner. Because of this prejudice, the abundant and tasty whitefish is probably Montana's most underutilized and overlooked sport fish. If the fishing public were more aware of all the good qualities of mountain whitefish, Montana's streams and rivers might be lined with enthusiastic anglers plying the waters for these neglected fish.

What is a mountain whitefish?

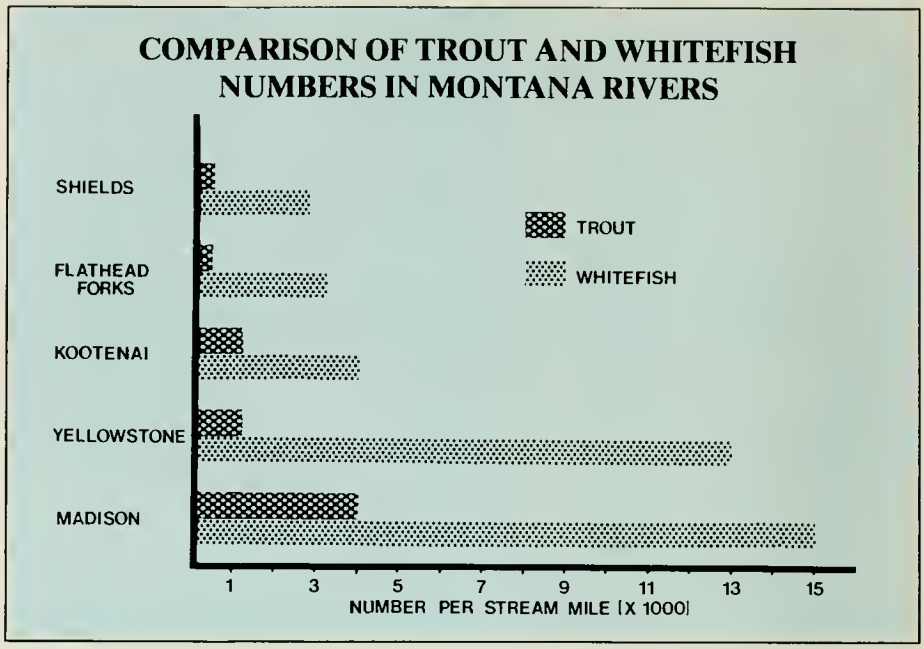
A member of the trout family, the mountain whitefish can be separated from non-trout species such as squawfish and suckers by the presence of a tiny adipose fin, located on the fish's back just forward of the tail fin. The body is cylindrical, and the snout elongated and pointed. The mountain whitefish has large scales, and it is greyish-bronze above, silvery on the sides, and dull white on the belly. Lewis and Clark described it as a "bottle-nosed fish" when they observed it on the upper Missouri during the early 1800s.

Mountain whitefish are common in cold-water streams and lakes on both sides of the Continental Divide, from Alaska south to the headwaters of the Colorado River. Whitefish are abundant in all three major drainages in Montana: the Columbia, Missouri, and Saskatchewan (St. Mary). They generally inhabit large rivers and major tributaries in the state, but can be found in lesser numbers in small headwater streams.

Mountain whitefish are sensitive to poor water quality. For example, they are less tolerant of drought and increased water temperatures in the Big Hole River than grayling, rainbow, or brook trout.

Most whitefish mature sexually in their third year. They spawn at night in October and November, in riffles of large rivers and lower reaches of major tributaries. Mountain whitefish do not build nests but broadcast their eggs over the gravel. The typical mature female contains about 4,500 eggs.

Montana whitefish average 10 to 12 inches; the state record, caught in 1977 in the Blackfoot River, weighed 4 lbs., 9¾ ozs. Fish as old as 8 years have been reported in Montana, and as old as 18 years elsewhere. The world all-tackle record, caught in the Columbia River in Washington, weighed 5 lbs., 2 oz., and measured 22.5 inches.



How do you catch a mountain whitefish?

Fishermen catch mountain whitefish year-round on a variety of natural baits and artificial flies. During spring and summer, they will readily strike small dry flies or weighted nymphs. Aquatic insects screened from the stream and impaled on a small hook are deadly for whitefish. They also take worms, and occasionally strike lures or plugs.

Many anglers fish for them from bridges during the fall spawning migration. Fishermen bait their hooks with maggots and weight their lines with sections of speedometer cable (the cable doesn't hang up on rocks as readily as split shot or sinkers).

Because whitefish take bait gently, small floats help detect strikes. Adjust the float so the bait travels near the bottom. Since whitefish feed all year, largely on bottom-dwelling insects, bait presented in this way should attract a strike.

A cane pole is effective during winter. It is particularly suited to fishing for whitefish because of the sensitivity of its tip; it is also useful in hoisting the fish over shelf ice along the river edge, and its larger guides won't ice up like those of a normal spinning rod. The most effective winter bait is the maggot, fished on a bare hook or placed on the tip of a small "ice fly" or whitefish hook.

Fishing opportunities for mountain whitefish in Montana are nearly unlimited. In the western fishing district, daily and possession limit is 100, and the season extends from the third Saturday in May through the following March. Portions of the Swan and Bitterroot rivers are open year-round. In the central district, the limit is also 100 fish, and most of the major rivers are open all year. In the eastern district, where whitefish are less abundant, the limit is 10 and commercial fishing is not allowed. Check current fishing regulations for exact information on the area you plan to fish.

An angler wishing to commercially catch whitefish can do so in certain waters after having his license validated (i.e., stamped—no cost) at a DFWP headquarters. Department of Health and Environmental Sciences standards must be met when preparing whitefish for sale. (This means they must be processed in a licensed facility inspected for sanitation.)

In an attempt to encourage greater use of this overlooked species, commercial fishing for mountain whitefish using commercial fishing gear was recently introduced into Montana. Commercial fishermen can try their luck on portions of the Clark Fork,

Bitterroot, Blackfoot, Flathead, and Kootenai rivers in the western district, and the Missouri and Yellowstone rivers in the central district.

Although several groups and individuals have attempted commercial fishing for mountain whitefish, only one, Bear Creek Fisheries of Libby, has been successful. Owners Gary Smith and Jane Cline reported a catch of approximately 2,000 mountain whitefish from the Kootenai River system during fall 1985. Record rainfall and high stream flows greatly reduced the catch. Smith believes the market for fresh-frozen and smoked whitefish will be good in the larger U.S. cities, and that Montana bars could offer a strong market for smoked whitefish. He hopes to increase his catch to 100,000 in 1986.

How do you prepare and eat mountain whitefish?

Mountain whitefish are quite tasty when cooked, smoked, or pickled. Most folks who maintain they are bony and no good to eat have probably never tried them. In 1960, the Montana State University (MSU) Agricultural Experiment Station developed some recipes for cooking whitefish, and then conducted a test of their palatability compared with trout. Whitefish and trout were collected from the Madison River, fried, and then judged on their texture, aroma, tenderness, and juiciness. The whitefish rated about as high as trout in all categories. For best results, skin whitefish before cooking, and remove the dark fat along the middle of each side of the fish.

To get you started, here are two tempting recipes for whitefish developed by MSU home economists:

BAKED WHITEFISH CREOLE

Remove skin from fish and cut into serving pieces. Fish filets may also be used. Place in baking dish and add Creole Sauce. Bake uncovered at 350°F for 45 minutes.

Creole Sauce

2 c. canned tomatoes
¼ c. chopped onion
¼ c. chopped green pepper
¼ c. chopped celery
1 bay leaf
1 clove garlic, crushed
2 T. butter/margarine
1 t. salt
pepper

Cook onion, green pepper, celery, and garlic in melted butter until tender, but not brown. Mix with remaining ingredients, and pour over fish.

BROILED WHITEFISH FILETS

The skin is usually removed when whitefish are filleted. However, if left on, place filets skin side down on a greased broiling rack. Dot fish with butter and sprinkle with lemon juice, salt, and pepper. Preheat broiler 10 minutes. Place rack 3 inches from heat and cook 10-12 minutes for ½-inch filet. Baste frequently with lemon juice and butter while cooking (½ c. butter, 3 T. lemon juice). Do not turn fish while broiling. Serve with tartar sauce, lemon butter, or dill sauce.

Whitefish have long been considered excellent table fare when smoked. For a reasonable fee, custom operators in most towns will smoke whitefish. However, if you want to do it yourself, here's how:

SMOKED WHITEFISH

Clean the fish, but do not scale them; remove the heads. After curing the fish in a brine of 1⅓ c. non-iodized salt per gallon of water, place them in a smoker and precook at 180°F for 30 minutes. Reduce the heat to 100°F and smoke for 10-12 hours.

If you decide to pickle your catch, try the following recipe from a 1977 issue of *Montana Outdoors:*

PICKLED WHITEFISH

40 whitefish
1 qt. very hot water
2 c. salt
2 qts. white vinegar (not less than 5% acidity)
onions, thinly sliced

Clean and scale the fish; cut off all fins and the tail. Cut into 1½-inch chunks. Make a brine of the water and salt; let cool. Add the vinegar and pour over the fish, completely covering them. Let stand 4-5 days. Pour off the brine and rinse with water. Pack fish in glass jars, tightly, with a layer of fish alternating with a layer of thinly sliced onion.

1 qt. white vinegar
2 c. sugar
2 T. salt
1 T. pickling spice
3 cloves garlic

Mix the above ingredients; bring to a boil. Boil 5 minutes; let cool. Pour over fish, completely covering them. Let stand for at least 5 days; 2 weeks is better. The fish will keep from 6 months to a year in the refrigerator. Eat them as they are, or add sour cream and serve over boiled potatoes. To store, use plastic wrap and a rubber band; a metal cover will rust.

What about future management of mountain whitefish in Montana?

Many advantages exist in developing a healthy sport and commercial mountain whitefish fishery, especially in light of ever-increasing angling pressure on the more popular trout and salmon. Fishing effort directed toward the mountain whitefish could relieve some of the pressure on less numerous trout. The DFWP has taken positive steps in this direction by increasing the creel limit to 100 whitefish in the western and central portions of the state, and by initiating a commercial whitefish season. But are these measures enough to make a difference?

In spite of DFWP regulation changes, there probably isn't a single stream in the state where harvest by man has made a dent in the whitefish population. Studies on the Flathead and Yellowstone rivers indicate whitefish are at least 10 times more numerous than trout. In many other Montana rivers, there are four or more whitefish for each trout. There's no doubt about it—the mountain whitefish is probably as underutilized as any natural resource in Montana.

So that leaves us with the question: What can we do to increase use of the maligned mountain whitefish? The only possible answer is to increase the public's awareness of its desirable qualities, thereby encouraging development of healthy sport and commercial fisheries. This won't be easy because of the low esteem in which the fish is held by most of Montana's anglers.

The major cause for the undesirable reputation of the mountain whitefish in Montana is because anglers continue to compare it with the flashier, more colorful, trout. The two species coexist in our streams, and fishermen simply prefer the trout. Many anglers also believe that whitefish compete with trout for food and space, although there is no clear evidence. In fact, trout and whitefish seem to partition the food and space in a stream. Whitefish feed mostly on aquatic insects living among the streambed rocks, while trout feed mainly in the middle upper parts of the water and on the surface. Trout and whitefish generally are found in different parts of a pool or run.

The truth is, the mountain whitefish is an abundant, scrappy, delectable member of the trout family, worthy of much better consideration than it now receives. Ask anybody who has eaten a properly prepared whitefish, and they will probably agree. And, by the way, those two whitefish I ate in the Bob Marshall this summer tasted great—they really did. ■

WHITTECAR STATE RECREATION

If you live near Hamilton and are interested in the shooting sports or archery, probably you are well-acquainted with Whittecar State Recreation Area. This popular 30-acre site is approximately three miles northwest of Hamilton, and it draws over 3,500 sportsmen to its pistol and rifle ranges and archery area each year.

During the early 1970s, subdivision growth in the Bitterroot Valley was rapid, and a shooting area in the Lost Horse drainage was closed when the property was sold for homesites. One of the daily users of the old range, William "Bill" Whittecar, was upset that in all of Ravalli County there wasn't a safe public area for shooting practice. Bill, a retired businessman, began looking for a suitable range site. He found a 30-acre spot, used as a garbage dump, belonging to the city of Hamilton. Bill was active in a community improvement group, Bitterroot Resource Conservation & Development, and he took the problem to RC&D Chairman Buss DuFour. The project to develop a shooting range was added to a list of community needs; Ravalli County residents needed a safe place to shoot rifles and bows, and law enforcement officers from the city, county, and state needed a place to practice and conduct shooting contests.

Folks from the area got together to talk about it in August 1975. Some of those attending thought the range should be named for Bill Whittecar. Others disagreed, saying it shouldn't be named for a living person. Then, during excavation of the range, a hard-shelled fossil unique to the area was discovered and named "whittecar." So the name then became acceptable even to those who had first objected—they could say it was named for the fossil, not for a living person.

During autumn of 1975, the community enthusiastically pitched in and helped with developing the range. Individuals contributed money and labor; Hamilton High School Key Club members and the Trapper Creek Job Corps turned out to help the Ravalli County workers; the city of Hamilton sent men and equipment to the project, and the Army Reserve hauled material for fill.

Total value of donated work and materials came to over $50,000. Because of these cooperative efforts, the range was ready for use in June 1976.

The Department of Fish, Wildlife and Parks (DFWP) bought the area for $21,500, with federal assistance from the Bureau of Outdoor Recreation. The Whittecar Rifle, Pistol, and Archery Range, a local club which is also a non-profit corporation and a National Rifle Association affiliate, manages the area. The local club has a 50-year term lease with DFWP and is responsible for operating the range. The club's primary purpose is to promote safe handling and use of firearms and archery equipment, and to provide a proper place for such use by the general public.

At the start of the project, some local residents were concerned that the shooting range would scare deer and elk away. Since the range has been completed, both deer and elk have continued to use the area throughout the year. Several shooting matches have been delayed until the wild creatures have finished feeding.

The area became so popular that a full-time caretaker was hired. The club bought a small area next to the range, developed it for housing the caretaker, and later donated it to the DFWP. In 1978, Hank Hauge and his wife Bea became the first caretakers. During their tenure, the range's popularity has continued—each year about 28 meets

TOM GREENWOOD

Caretaker Hank Hauge tunes his rifle at one of Whittecar's 10 covered shooting benches.

AREA: Popular Spot by Ruth Greenup

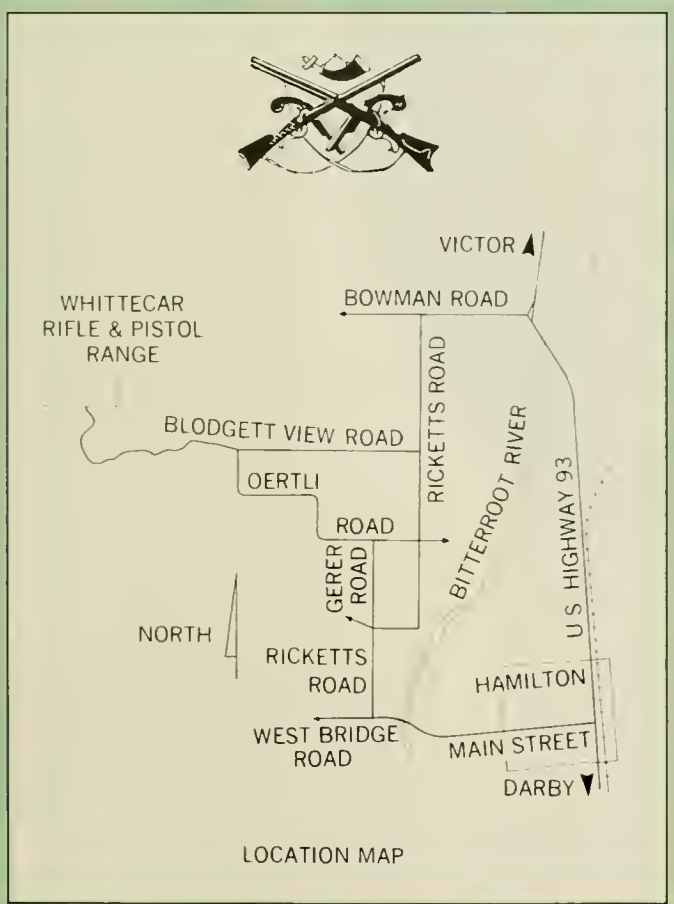
are held there. Hank has given firm notice that he is retiring May 1, 1986. Finding another caretaker as dedicated will be hard, but range directors would like to hear from anyone who might be interested (write P.O. Box 603; Hamilton, MT 59840, or give the chairman, Lloyd L. "Grumpy" Greenup, Sr., a call at 406/363-4257).

The recreation area includes excavated 100-, 200-, and 300- yard rifle ranges with 10 target stands and covered benches. The pistol range extends to a maximum of 50 yards and also has covered shooting stands. For real sharpshooters, there is a silhouette range for .22 caliber rifles. For archers, a "roving range" extends across the east and north sides of the property. Small heated buildings offer shelter in extreme weather; they also contain benches for those with reloading equipment. The area contains some picnic tables and "country rustic" plumbing.

The range is open all year from 8 a.m. to 8 p.m.; with supervised use, a chronograph (an instrument used by ballisticians to measure the time it takes for a bullet to pass between two given points) is available. Fee is $1 per day, or $10 for a season pass (an additional fee is charged for chronograph use).

The DFWP maintains two other shooting areas in the state: one developed with local assistance near Havre at the Rookery State Recreation Area, and the other developed at Makoshika State Park near Glendive by the Lower Yellowstone Outdoors Association. The National Rifle Association provides information on range developments and may also offer limited financing.

For Missoula area sportsmen, a new recreation site—12 miles west of Missoula near Harper Bridge up Deep Creek—is in the planning stages. The Deep Creek Recreation Area will offer a wide range of shooting opportunities, such as 100- to 200-yard ranges, a 1,000-yard big bore range, two silhouette ranges, small bore areas, and pistol ranges. Land for this new recreation area is now owned by Champion Timberlands and the DFWP is trying to acquire over 100 acres. Work will begin in summer of 1986. ■



TOM GREENWOOD

Whittecar includes 100-, 200-, and 300-yard rifle ranges, a pistol range, and a silhouette range for .22 caliber rifles.

Gertrude Hurlbutt

A Name For The Game

by Jean Walker

Although it is not exactly a household word, it is a familiar one to hunters, clay target enthusiasts, and other recreationists. The word is "skeet." It is the name of a game originated in America, developed in Massachusetts, but named by a woman who lived several thousand miles from Massachusetts in Montana.

In 1920, near Andover, Mass., a group of upland game bird hunters was practicing wing-shooting by shooting at clay targets thrown from a machine. They were using a range they had designed to simulate expected field shots—a complete circle of 25 yards radius, with the circumference marked off like the face of a clock. The trap machine was set at 12 o'clock and threw the targets over 6 o'clock. The shooters would shoot two shots from each of the 12 stations. In "shooting around the clock," as the game was informally called, shots were fired to all points of the compass, but when a neighbor started a chicken farm adjoining the property, the range had to be revised. The problem was solved by installing a second trap machine and placing it at 6 o'clock so it threw a

target over the 12 o'clock station. This gave the shooter the same practice shots as found in the original full circle, but reduced the danger area by half with a semicircle course.

Noting the appeal of the game, William H. Foster, one of the originators, became convinced that it could become nationally acceptable and set about developing a shooting program that would combine the necessary elements of wing-shooting practice and a competitive sport. When details of the game had been worked out and tested, Foster introduced the idea to the public in the February 1926 issues of two national magazines, *National Sportsman* and *Hunting and Fishing*. At the same time, he announced a contest, with a $100 prize, for naming the new game.

Some 10,000 entries were sent to the two magazines, and the judges selected the entry of Gertrude Hurlbutt of Dayton, Mont., as the winner. She suggested the word "skeet," an old Scandinavian form of the word "shoot." Acknowledging notification of the winning entry, Mrs. Hurlbutt wrote: "No one in all America could have appreciated that $100 more than I, for $100 checks are seldom seen by Montana ranchers during one of our worst periods of drought. I do hope the sport of Skeet will be worthy of the prize."

American sportsmen were apparently ready and waiting for a practical form of wing-shooting practice that would give them opportunities to test their skills any month of the year on a series of shots similar to those encountered in hunting, and the sport grew and prospered. Eventually, a National Skeet Shooting Association was formed. During World War II, the government quickly recognized the value of the sport in gunnery training, and ranges were established on military posts and bases.

Mrs. Hurlbutt continued her interest in the growth of the game she had named. *Skeet Shooting News* published a letter from her, saying: "Each year I have followed the development of this game, so rapidly growing. The recognized popularity which Skeet has achieved has given me a far greater thrill than the receipt of the $100 prize money." She was happy she had named a game sportsmen enjoyed.

In 1966, when she was interviewed on her 90th birthday, she recalled that giving skeet its name was one of the proudest and happiest incidents of her long life. However, she had accomplished many other things of which she could be equally proud.

Leaving Edinburg, Ill., in 1910, Gertrude Hurlbutt, her husband, and 9-year-old son planned to go to California for reasons of her health. But they had an opportunity to purchase some land near Dayton, and they settled there.

Gertrude loved nature, and gardening was a special hobby. The plots around her home contained more than 6,000 tulips, and on some days, members of three different garden clubs toured her yard. She wrote and lectured extensively, and was active in the community; she served on the Dayton School Board and was on the election board for 18 consecutive elections, retiring from that position at 80.

She was a talented writer, and served as a correspondent for the Daily Inter Lake in Kalispell and the Polson Courier for 34 years. Her creative writing ability was expressed in poetry, which she sometimes used in her talks on flowers and gardening. She published at least two songs. One of them, "My Buddy, My Brother, My Friend," was dedicated to the American Legion and is still used. Always patriotic, Mrs. Hurlbutt sold war bonds during World War I and one of her most prized possessions was a letter of appreciation from the U.S. Treasurer.

The first skeet range in Montana was built by another Illinois native. William Finlay came to Montana in the early 1900s as a market hunter, but later settled in the Great Falls area where he became Montana's first certified public accountant. Finlay became interested in skeet and laid out a regulation range at the gun club in Great Falls in 1939 or thereabouts. Due to Finlay's attention to detail, this field was known as the most accurate and precise range in all of the United States. It is still used today by the Sun River Skeet Club in Great Falls, and William Finlay was still shooting on it at the age of 91, several years before his death.

Today, the competitive skeet program usually consists of four rounds of 25 shots each, making a perfect total of hits a score of 100. This score, called 100-straight, is the goal of tournament shooters and is not easily accomplished. In 1976, Nancy Staton, shooting at the Missoula Trap & Skeet Club's ranges, became Montana's first 100-straight female shooter. It is a curious coincidence that Nancy lived in Dayton as a child, in a house where the nearest neighbor was a kind, grandmotherly woman named Mrs. Hurlbutt. While Nancy was growing up, she became great friends with their neighbor and remembers Mrs. Hurlbutt gave her a kitten. When that kitten became older and had a family of her own, Nancy repaid her friend with *two* kittens. This led to a "kitten exchange" between the older woman and the little girl that lasted for over eight years.

There was a moment of embarrassment for Nancy's mother when Nancy and her sister gathered a large bouquet of Mrs. Hurlbutt's tulips and ceremoniously presented them as a token of friendship to Mrs. Hurlbutt at her front door.

Later, Nancy married and moved to Missoula, Mrs. Hurlbutt moved to Polson, and they lost touch. Nancy does not recall ever talking with her friend about hunting or shooting. As a child, it probably would not have meant a thing to her had she known that Gertrude Hurlbutt gave skeet its name. But after scoring 100-straight, she recalls the happy memories about the kind woman who gave kittens, flowers, and friendship to a little girl, and who named a sport for her to enjoy as an adult.

Mrs. Hurlbutt died at 93 in 1969. This was one year after the International Olympic Committee included skeet shooting in its program. In 1984, the first Olympic Gold Medal won by an American in skeet went to another Pacific Northwesterner, Matt Dryke of Sequim, Wash.

Mrs. Hurlbutt's hope, as expressed in the letter she wrote after she was notified she had won the $100 prize, has been realized: The game has become a "worthy" sport enjoyed by young and old of both sexes. The National Skeet Shooting Association placed a memorial marker at Mrs. Hurlbutt's grave. The marker, in Polson's beautiful Lakeview Cemetery, overlooks her beloved Flathead Lake and the Mission Mountains, and it honors the memory of the woman who gave the game of skeet its name. ■

Eight-Legged Predator

by Lisa Mathis Butler and G. Wesley Burnett

In the dark of the night, the creature lays its trap, moving quickly on many long, clawed legs. At dawn it reaches out to test the trap's strength. The early morning light reveals its multiple eyes and a fanged mouth capable of subduing, poisoning, and draining the blood from victims larger than the creature itself.

Although this description could fit a monster in a Hollywood sci-fi flick, it would do equally well for a harmless garden spider. Surprisingly, the spider probably frightens more normally reasonable people by innocently rounding the corner of the breakfast table than most of Hollywood's movie monsters.

Seen many times magnified, the spider *does* look like part of the set of a not-very-good monster movie. Since it is small, the spider is often lumped with insects and other small creatures and referred to as a "bug." But scientists class spiders with a group of animals—including scorpions, ticks, mites, harvestmen or daddy-longlegs, and others—known as arachnids. Unlike insects, which have three major body sections, six legs, and usually wings, spiders have two major body sections, eight legs, and no wings.

Spiders usually have eight eyes, although some species have only six, four, or two, and in one case only one. Some cave-dwelling spiders have no eyes at all. Even if it has numerous eyes, spider eyesight is limited. Taste is developed to the point they can sense unpalatable prey, but spiders probably have no sense of smell. Touch is highly developed, though, and most spiders depend on this rather than on the other senses. The slightest vibration of a web tells a hidden web-spinner that a potential meal has stumbled into its trap.

The spider's jaws, or chelicerae, are divided into two parts, a thick base and a sharp fang. When not in use, the fang rests in a groove. The spider extends the fang to puncture, stun, or kill prey with poison. The meal is then gradually crushed and predigested; digestive fluid is released into the body of the prey by the spider, breaking down its tissues and enabling the spider to suck the edible portions out of the prey's body covering. All spiders feed by sucking; they never chew. When the spider has finished a meal, which may take several hours, all that is left is a small mass of the harder body materials the spider couldn't digest.

To the sides of the mouth, just outside the jaws, are a pair of pedipalps. These may be mistaken for antennae, which spiders do not have. The pedipalps are similar to legs and are specialized in the male for transferring sperm to the female. The eight real legs are attached to the front section of the body, the cephalothorax, where the eyes and mouth parts are also located. Leg length varies according to species, and spiders normally have hairs specialized for spinning silk, digging

burrows, climbing, and other activities.

The spider's abdomen contains the lungs and other major internal organs. Near the top of the abdomen are the spinnerets, small appendages connected to glands in which various types of liquid silk are produced and stored. Although there are various types of spider silk, some kinds possess incredible strength and elasticity. For example, the radial supporting strands of orb webs are very strong; the familiar sticky strands that catch and hold unwary insects are quite elastic. A single silk line may be as thin as one-millionth of an inch, but most are 10 to 20 times thicker.

Because spider silk is so fine, it is often used in surveying and laboratory equipment where ability to make accurate, fine measurements is necessary. The silk, liquid as it is secreted, solidifies outside the spider's body, probably from complex chemical interactions with air. Spider silk is made of protein, and spiders spin it much like silkworms do, but commercial production is impractical. Maintaining a sufficient number of solitary, predatory creatures like spiders would be much more difficult than raising vegetarian silkworms.

Spider life is completely governed by instinct. Major groups of spiders are distinguished by the instinctive use to which they put their silk. Mobile hunting spiders use "draglines"—silk reeled behind them and anchored from time to time, creating a useful safety line in case of a fall. More sedentary spiders build web after web in the same corner and, while capable of moving quickly and gracefully across the web, they may be quite awkward on other surfaces. The degree to which instinct regulates the spider's life is demonstrated among orb-weaving spiders by the young spiders' ability to build perfect specimens of their well-known circular webs shortly after hatching.

The predatory instinct is so deeply ingrained that spiders may strike at any reasonable prey, often including brothers, sisters, mates, and parts of their own bodies which have been torn off by predators or accidents. That the generally larger female automatically consumes her mate is a myth in most species, but during mating, the male may find himself devoured should he misjudge the female's amorous mood or linger long enough for her predatory instinct to overcome her reproductive instinct. Understandably, the male's life expectancy is considerably less than that of the female's.

DAVE TYLKA

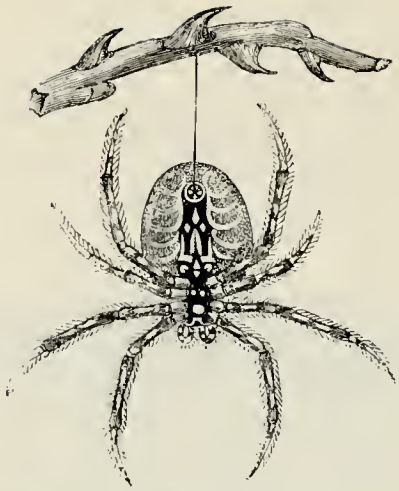
The infamous black widow is quite common in Montana. It is unaggressive and shy, preferring to build its tangled webs in dark, hidden places.

Survival of the species among such dedicated predators generally requires an isolated and dispersed life. In fact, lest they devour each other, siblings must disperse rapidly. In many species, this happens by "ballooning." The young climb high on grass, bushes, or fence posts, raise the tips of their ab-

domens, and release strands of silk which, caught by the wind, carry them to new homes, sometimes hundreds of miles from where they hatched. The sight of a late spring or early summer meadow made hazy and sparkling by the webs of thousands of tiny ballooning spiders is so thrilling that our English vocabulary has a special word to describe it: "gossamer"—meaning a fine film of floating web or, more commonly, a sheer, gauzy fabric or anything delicate, light, or insubstantial.

Spiders have existed for millions of years. Indeed, they are probably millions of years older than insects, their chief modern prey. Early spiderlike arachnids used silk to cover and protect their eggs—something spiders continue to do. Intruders would disturb the loose strands around the egg sac, alerting the watchful mother to the presence of egg hunters. Venturing forth to defend her precious eggs, she often made a meal of the intruder, especially if its legs had become tangled in the web. Different methods of using silk to construct webs, egg sacs, and homes characteristic of different species developed over time, mostly in response to prey behavior. As insects, increasingly important in the spider's diet, adapted to increasingly narrow and specialized habitats, spiders ruthlessly followed them, adapting their behavior and use of silk as well. Some scientists argue that insects took to the wing in order to escape spiders and that some spiders responded with the orb-web, a lethal and effective means of capturing a flying insect.

Spider groups differing from those we regard as "typical" web-spinners often have names—bolas, purse-web, trap-door, wolf, jumping, and crab—which describe their life styles and hunting modes. The bolas spider catches prey with a method reminiscent of the bola-throwing cowboys of South America. Rather than constructing an entire web, it casts a strand of silk with a sticky glob of liquid on the end at passing insects. Purse-web spiders build closed tubes of silk, often along tree trunks, and have developed long fangs with which to bite through the silk to insects traveling across the outside of the tube. Of the several different types of burrowing spiders, trap-door spiders are regarded as



Multiple eyes, fanged mouth, capable of draining the blood from a victim larger than itself. A Hollywood monster? No—an eight-legged creature we call spider.

masters of underground home construction. They use their silk to cover and protect eggs, to line burrows, and to build the perfectly fitting hinged doors for which they are named.

Both wolf and jumping spiders have a more active hunting style, stalking and pouncing on their prey rather than waiting for an accident to happen. Stalking requires of these spiders much better vision than that of their myopic, web-dependent relatives. Jumping spiders can see relatively clearly a number of inches away, and can be easily seen to follow the movements of insects, or even a finger or pencil held in front of them.

Many crab spiders choose flowers as their hunting grounds, lying in wait with their elongated front legs held forward and together, in a stance similar to that of a crab with its heavy front claws. When an unwary insect visits the flower, a crab spider is able to grab and kill it. Although often tiny, its effective poison allows it to kill even large bees and butterflies.

Even though a predatory, cannibalistic life style requires that spiders live virtually alone, some have become cooperative and communal. These spiders share webs that may expand to cover the branches of large trees, much as certain types of caterpillars group together. In parts of Mexico, these branches are sometimes taken indoors and hung from the ceiling where they help control flies and mosquitoes. This represents one use of spiders to better man's existence.

Although many primitive cultures have highly regarded the spider's stealth, man and spiders have not mingled much. Spiders, however, consume more than their share of insect pests, and this contribution to human well-being should not be taken lightly. In England each year, spiders, which may number 2 million individuals per acre, may consume more weight in insects than the weight of the human population of that country, or so it has been estimated. Unfortunately, applying insecticides may damage spider populations as much as insect populations. More recently, unified pest management programs have tried to spare spiders and to more effectively utilize them as an ally in crop protection.

Stealth, patience, silk, and poison have made the spider a remarkably successful predator, but the poison of most spiders is of little danger to man. Insect bites and other skin irritations may often be mistakenly attributed to spiders, adding to our human tendency to regard the spider with at least some suspicion. Most smaller spiders have difficulty in even puncturing human skin.

Effects of spider poison vary on different animals. Some poisons affect only insects and other arthropods, some are dangerous to reptiles and amphibians, and others affect man and other mammals. The bites of most spiders found in the United States cause only relatively mild symptoms, such as burning, numbness, or swelling around the bite, and last only a short time. Even bites from the large "tarantulas" found in the United States (with such fierce appearance they are often used for thriller effects in movies) cause little more injury than breaking the skin and bruising, the type of damage that might be expected from the bite of any similarly sized nonvenomous animal. North American tarantula bites can be painful, but the pain is normally short-lived. Tarantulas from other—mostly tropical—parts of the world can cause more painful bites, not surprising of an animal

large enough to kill small birds and mammals as large as guinea pigs.

Two spiders in North America have gained the most notoriety for their venom. The brown recluse, also known as the "violin spider" or "brown spider," was not known to be poisonous until the 1950s and did not receive much attention until the mid- to late 1960s when numerous articles warning the public began appearing in newspapers and magazines. Obscure and shy, the brown recluse is thought to be a Midwest native whose range has expanded through its accidental shipment in agricultural products. In Montana, the brown recluse is not common, although spiders believed to be brown recluses bit two men in Miles City in 1984, and nine years ago, a Great Falls woman was paralyzed as the result of an allergic reaction to the toxin of a spider believed to be a brown recluse.

As its name implies, the brown recluse is shy, preferring dark, dry places. Its shy, unaggressive nature does not necessarily lessen the danger of being bitten since shoes, clothing, and dark storage areas especially appeal to the brown recluse. It is most likely to bite when trapped, as when its hiding place is the sleeve of a shirt that is dragged across a human arm.

Brown recluse victims may not realize they have been bitten until an hour or more afterward, but bites normally cause intense, although not necessarily immediate, pain. Symptoms vary, depending on the victim's sensitivity and severity of the bite. A small blister appears at the site of the bite, followed by inflammation which spreads to a larger area. Later, affected tissues die and are sloughed off; the center of the area sinks and lesions that develop may be quite large, sometimes requiring skin grafts. Healing is slow. Rarely, victims may experience other symptoms, including fever, chills, jaundice, and convulsions.

The infamous black widow is relatively common in Montana. It, like the brown recluse, is unaggressive and shy, preferring to build its tangled webs in dark corners and hidden places. Unless it is trapped or feels threatened, it is more likely to walk across a human arm rather than bite it. It has such poor eyesight it will generally regard a person in much the way it would a wall or a floor. The bite of a black widow causes rapid, sharp, localized pain. The pain gradually moves to other parts of the body and concentrates on the legs and abdomen. Other symptoms, such as nausea, tremors, and shock, may also accompany the pain. Symptoms are related to the neurotoxic nature of the venom affecting nerve center and motor actions. Breathing may also be affected.

Besides black widows, which are found throughout the continental United States, other types of poisonous widow spiders occur worldwide and all behave much like the common black widow. Both red widow and brown widow spiders inhabit southern Florida.

Although some spiders inflict painful bites which may be fatal in a few cases (particularly among the very old or young, or those already weak), very few deaths or serious illnesses are attributed to spider bites. In any year, snake bite or rabies, both mercifully rare, cause more human deaths or serious illnesses.

Certainly, for North American sportsmen, insects are by far the greater source of irritation and discomfort. In fact, the most common problem with spiders is their exasperating tendency to place webs across pathways, often entangling hikers rather than insects. The minor irritation is a small price to pay for so able a predator—whose life is dedicated to consumption of pestiferous insects. ■

DAVE TYLKA

As its name implies, the brown recluse is shy, seeking dark, dry places. Also called the "violin spider" or "brown spider," it was not known to be poisonous until the 1950s.

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